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Aid and the Balance of Trade

OVER-SIMPLIFICATION is apt to result in a distorted perspective, more especially when applied to problems of such magnitude and complexity as the ever-growing burden of foreign aid. Particularly dangerous is the tendency in some quarters to equate economic aid with economic war, though it is becoming increasingly apparent that the ideological struggle between East and West—assuming that there are any ultimate victors—will be won or lost on the field of international trade, and that the decisive weapons will be neither guided missiles nor hydrogen bombs but grants and loans.

Political (should we say ideological?) considerations apart, an urgent case for stepping up the outflow of aid from the industrial countries of the Western World can be made out on the ground of self-interest alone. Only by accelerating the progress of the poorer (but in some instances most densely populated) countries can we assure Western industry of the expanding markets necessary for its future growth.

Coexistent with the surge of nationalism or tribal aspirations throughout many emergent territories is the desire to share as fully and as speedily as possible in the material benefits of Western civilization. Indeed, it could be said that the stability even of such an autocratic regime as that of Ghana is basically dependent on the Government's ability to deliver the goods in the form of fuller employment, higher wages, and new opportunities for advancement. Hence Dr. Nkrumah's determination to prevent gold mines from closing down, even at the cost of taking them over and running them at a loss.

By one of history's supreme ironies the terms of trade began to run strongly against the underdeveloped countries about the very time when, throughout Asia, Africa and Latin America, economic advancement with independence was becoming the slogan of governments and secessionists alike and when national resources were coming under increasing strain from attempts to do too much in too short a time. This orgy of long-term planning derived a further impetus from the rush to stockpile basic commodities at the time of the Korea crisis, which sent the prices of most strategic metals and minerals to levels never previously nor since equalled.

This abrupt transformation in the terms of trade was not sustained. Whereas the prices of finished goods were trending gradually higher throughout the greater part of the past decade, those of many metals and minerals have fallen steeply, due to the widening margin between production capacity and world demand. Between 1951 and 1956, for example, U.S. export prices rose by about 8 per cent and those of the U.K. by 14 per cent, but those commodity prices which did not actually decline showed little tendency to rise. During this period the terms of trade of the Latin American countries deteriorated by about 6 per cent and those of the overseas sterling countries by no less than 21 per cent.

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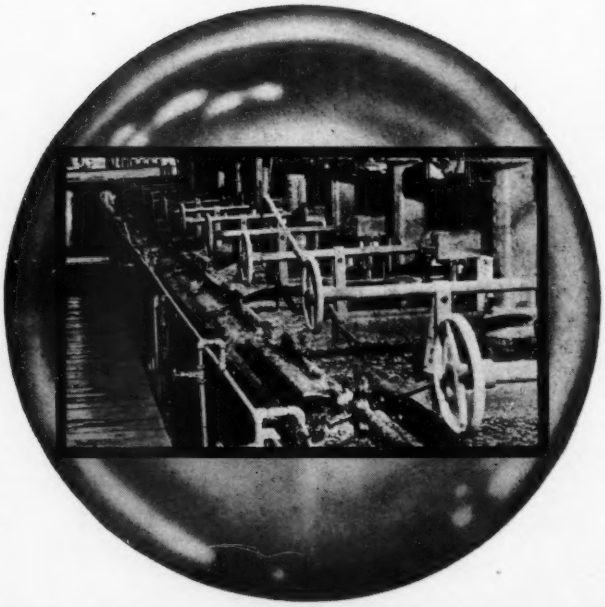

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TAB. 127A

The economic recession, which came about in 1956-57 as a result of attempts by the industrialized countries to combat inflationary pressures by tight monetary policies, led to a further decline in the prices of basic commodities as well as in the volume of exports. Unfortunately the continued existence of surplus production capacity has prevented most of the primary producing countries from reaping a corresponding benefit in trade terms from the resumption of world expansion in the past two years. Indeed, the Latin American countries were actually worse off in this respect at the middle of 1960 than when the recession was at its worst.

Now, with the purchasing power of their exports in terms of imports at least 20 per cent lower than it was ten years ago, the primary producing countries are faced with the possibility of a further worsening in their terms of trade as a result of the stagnation of the U.S. economy and the tighter monetary policies of the U.K. and other Free World countries. The prices of manufactured goods show few, if any, signs of falling, but those of primary commodities have once again been subjected to the downward pressure engendered by persistent inventory reductions.

Bedevilled on the one hand by rising import prices and on the other by dwindling export cheques, the primary producing countries must tend to view the world as a place where, in the words of the once popular song, the rich get richer and the poor get poorer. It is too much to expect that their natural resentment at what must appear, on the face of it, an unfair and irrational situation, should be wholly allayed by grants and loans from the wealthier manufacturing countries, on however large a scale, more especially when the United States, which is both the largest buyer of primary commodities and the principal source of foreign aid, has added to their difficulties by imposing tariffs and quota restrictions on imported metals and minerals in order to protect the interests of her own domestic producers.

The fact that in the absence of political understanding the friendship of the underdeveloped nations cannot be bought by financial and technical assistance, as the West on various occasions has discovered to its cost, does not, of course, invalidate the case for stepping up foreign aid to the fullest possible extent. Since the purchasing power of exports from the underdeveloped countries has fallen by more than a fifth in the past decade, it is evident that foreign aid on a large and continually rising scale is essential merely to maintain the *status quo* in terms of real income. As with Alice, it becomes necessary to run faster and faster just to stand still, let alone advance.

Western economists may argue that movements in the terms of trade merely reflect the normal working of the law of supply and demand, but in a world where the movement of commodities in international trade is hindered by artificial restrictions and barriers, this argument is not altogether convincing. Certainly it is unlikely to be favourably received by countries on the wrong side of the trading counter. Indeed, the gradual loading of the dice against the primary producer which, speaking in general terms, has been a salient feature of world trade ever since the Korean boom petered out, has perhaps contributed more than any other single factor to the decline of Western prestige and influence in uncommitted countries.

The problem is one to which time may conceivably bring its own solution. Thus existing copper facilities plus the small amount of new production at present scheduled to come in over the next couple of years, is likely to be fully absorbed by expanding consumption some time in the middle or late sixties, and in the meantime cutbacks, stockpiling and production losses from strikes and political unrest should be well able to keep supply and demand in balance.

Commodity stabilization, as achieved by the International Tin Council and also in the case of some agricultural products, has shown itself capable of assuring primary producers a profitable return, though it should not be forgotten that in the years of restriction the tin producing countries, notably Malaya, paid a heavy price in terms of unemployment and hardship for the maintenance of price stability. Voluntary restrictions on output or exports, as in the case of lead and (formerly) zinc can also lead to higher prices.

Such various stabilization measures must, however, mean that prices are likely to be restored to the levels that, a few years ago, were coming to be regarded as the norm.

In the foreseeable future, there would appear to be no practical alternative to aid and still more aid, not only as a means of winning friends and countering Soviet influence, but also as a prop for the struggling economies on which our own future as manufacturers and exporters must depend.

U.S. expenditure on foreign aid has latterly been at the rate of $3,500,000,000 only part of which, however, could be regarded as genuine development aid. President Kennedy's foreign aid plans cannot be finalized until the annual battle for funds has been decided, but the new President has announced his intention of asking Congress for around $5,000,000,000. As part of his plans to safeguard the dollar, he has lost no time in following the example of his predecessor, President Eisenhower, in putting pressure on America's allies to foot the bill. In this connection it is noteworthy that Western Germany now envisages a regular annual contribution for credits and grants to the poorer countries. The German Cabinet has been working on an aid programme for 1961 estimated at $1,000,000,000, but not all the details are yet known. Total U.K. expenditure from public funds on economic and technical assistance to overseas territories rose from £75,000,000 in 1957-58 to roughly £100,000,000 in 1958-59.

It is interesting to note that, according to Russian sources, during the period between January 1953 and June 1960, the Soviet Union's financial aid to underdeveloped countries amounted to U.S.$2,470,000,000, of which two-thirds went to Asian countries. In addition to Soviet financial aid, Asian countries received financial aid from China (U.S.$139,100,000); from Czechoslovakia, ($158,600,000); from Poland ($75,600,000); from Rumania ($12,100,000); and from East Germany ($10,000,000). These are total figures for the period and thus mask the step up in the annual rate of aid. Nevertheless, it is clear that Eastern aid is as yet on nothing like the scale of that from the West.

Moreover, it is inevitable that much of it will be spent on the exploitation of mineral resources in underdeveloped areas. Are we in Britain ready to grasp the opportunity this prospect presents?

FRANCE USES MORE COPPER

A study by the U.S. Commerce Department indicates that France, the world's sixth largest consumer of copper, used over 50 per cent more of the red metal in 1959 than in 1949. Domestic consumption in these two years amounted to 206,900 s.tons and 132,000 s.tons respectively, but in 1958, as much as 239,000 tons of copper was consumed. Indications point to a high level of consumption in 1960.

The rising trend of copper consumption in France in recent years is attributed both to the country's economic growth and to a growing volume of exports. During the past decade the population has increased by 10 per cent, amounting in 1960 to 45,300,000, while from 1956 to 1959

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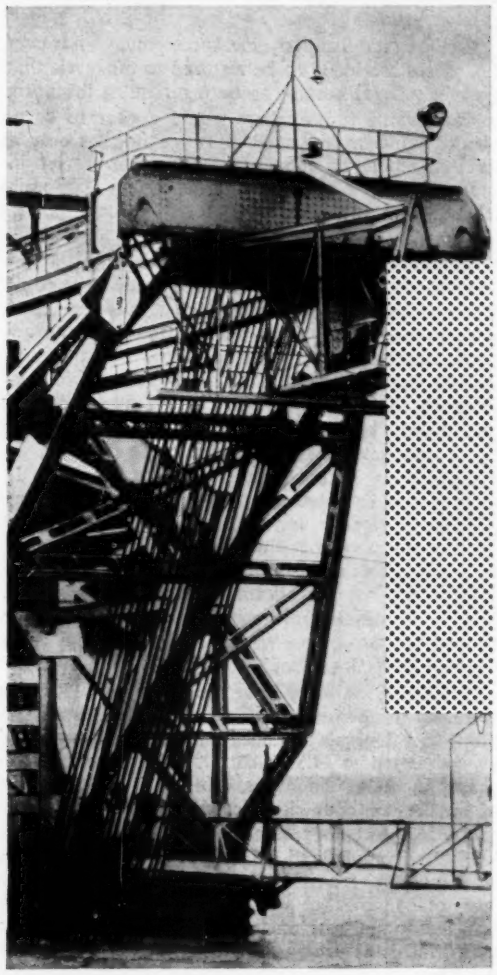

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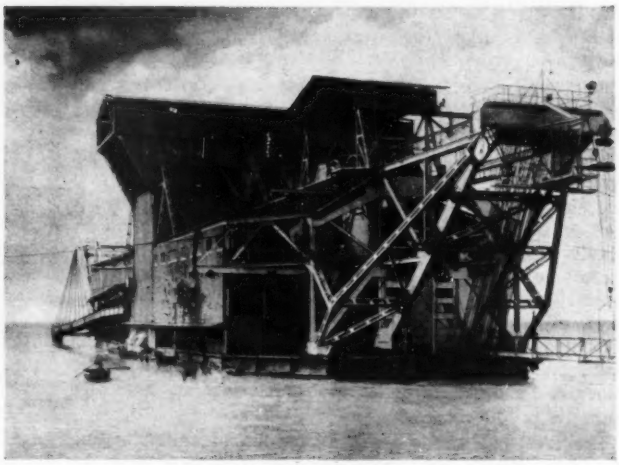

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the gross national product rose by about 37 per cent. This progress has been reflected not only in a heavier overall demand for copper in durable goods and other expanding industries, but also in substantial gains in *per capita* consumption, to which heavier exports of semi-fabricated copper products have also contributed. From 6 lb. per head of the population, consumption has risen to about 9 lb. as compared with about 15 lb. in the United States (which, however, ranked only fourth on a *per capita* basis in the 1957 list of world consumers).

France's production of brass mill products rose in 1958 to a peak of 187,000 tons, but a still higher output is indicated for last year.

Due to the lack of domestic ore reserves, France is almost completely dependent on imports of copper raw materials. In 1959, recovery from domestic ores totalled only 670 s.tons, mainly as a by-product of gold and silver mining operations. The only significant copper reserves within the French Union are at Akjoujt, Mauritania. Production of refined copper in France is principally from imported anode and blister. From 1945 to 1957 output ranged from 20,000 to 22,000 s.tons, but in 1958 it rose sharply to 26,200 tons and in 1960 to 30,500 tons. Production of blister and black copper, however, declined from 10,600 tons in 1954 to 5,400 tons in 1959. In the latter year, imports of refined copper amounted to approximately 178,000 s.tons, having fallen sharply from the previous year's record total of 238,000 tons.

SLOWER EXPANSION OF AUSTRALIA'S MINERAL INDUSTRY

The Australian mineral industry over the past decade has been continuously expanding but there has been a levelling off in the rate of expansion in the last three years, according to the latest quarterly review of the Australian Mineral Industry just released by the Bureau of Mineral Resources, Geology and Geophysics.

Major factors in stimulating mineral production over the past decade have been the demands of expanding secondary industry, particularly iron and steel, engineering, chemicals and construction materials. Production has also been stimulated by export market conditions. In 1959 the export index at constant prices for all minerals was 201 compared with 108 in 1950 (1948-50 = 100). This increase, which showed a levelling off from the peak of 207 in 1957, is largely the result of increased exports of mineral products other than refined metals. The export index of refined metals has fallen recently owing largely to restrictions on exports of refined lead and bullion.

For the most part domestic supplies of raw materials are adequate, but there are certain instances where resources are lacking or cannot at the moment be economically developed. The principal deficiency is, of course, oil. The discovery of domestic oil supplies would be the most important single break-through in the development of the mineral industry. Otherwise, the general picture for the future is one of steady expansion of production of a wide range of mineral products, with notable developments possible in some fields, for instance, in the exploration for new iron deposits and their development under the stimulus of the government's recent relaxation on exports. Secondly as a result of mechanization in the coal-mining industry increased production of coal is likely along with the opportunity for developing export markets. Thirdly, continued exports of copper are envisaged with increased production, in the long term, from Mount Isa, while increased refining capacity for the base metals is likely, as is an expansion of the bauxite-alumina-aluminium industry based on the bauxite deposits of N. and W. Australia.

COAL OUTPUT DECLINES IN 1960

Coal production figures now being released for the Western world in 1960 show little significant change in the reduced production trend in recent years.

In Britain coal output was held below the level of demand during the year; deep mined output was 9,000,000 tons less than in the previous year, opencast production 3,000,000 tons less. By intentionally restricting output during a year when internal consumption rose, the British N.C.B. were able to lift more than 6,000,000 tons of their undistributed stocks which, at the beginning of the year, stood at almost 36,000,000 tons. Latest figures show that in the last weeks of January 1961 stocks were being moved at the rate of 600,000 tons a week. Recruitment was again restricted in 1960—although less tightly than in the previous year—and the number of men in the industry fell by 52,000 to 582,000. Total saleable output was 186,140,000 tons deep mined, supplemented by 7,580,000 tons opencast. During 1960, 44 pits were closed bringing the total number of closures in the last three years to 136.

Elsewhere in Europe, the Coal and Steel Community experienced a year of little change. The ECSC coal output in 1960 amounted to 233,900,000 tonnes against 234,900,000 tonnes in 1959, according to figures released by the High Authority. Declines in Belgian and French production were largely offset by rises in West Germany and the Netherlands.

West Germany's coal output in 1960 totalled some 142,300,000 tonnes—455,000 tonnes more than 1959, while in the Netherlands production rose by 4.3 per cent to 12,500,000 tonnes. On the other hand the French output declined by 2.9 per cent to less than 56,000,000 tonnes and Belgium's production at 22,400,000 tonnes was 1.5 per cent below the 1959 result although this was due largely to a production loss of 350,000 tonnes caused by labour unrest. Italy produced 734,000 tonnes; about as much as in 1959.

In the U.S. the year provided the lowest yearly coal output since 1954 with the twin bogys of oil and natural gas again responsible for much of the decline despite governmental control of oil imports, particularly to the Atlantic Seaboard. These restrictions cut the import of residuals by over 8,000,000 barrels—equivalent to some 2,000,000 tons of coal. Whether or not the new U.S. administration will continue to impose restrictions remains to be seen. Additionally, the current industrial recession in the country accounted for a significant drop in coal consumption.

Provisional 1960 production figures indicate a drop of 5,000,000 s.tons compared with the bituminous total of 412,000,000 realized in 1959. Anthracite output dropped by 15 per cent to an all time low of 18,000,000 s.tons.

When considering the future position of the Western world's three major producers there appears to be some conflict of opinions. The ECSC is somewhat apprehensive. As a spokesman for the High Authority recently pointed out "Though in 1960 sales of coal were marginally higher than in 1959, consumption in the next few months is likely to be lower. The recent slight cyclical improvement must not conceal the relative structural weakness of coal in the energy market. For while in 1960 coal sales remained virtually static, sales of fuel oil rose by over 25 per cent. This leads one to wonder, what would happen to coal at a time when demand for energy was generally falling off?"

In the U.S. the spokesmen for the industry appear to be, if not optimistic, at least not too despondent, and on balance it would seem that the next few years will not have any marked effect on the industry either way.

In Britain, however, the prevailing atmosphere is distinctly cheerful.

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Quebec's New Metal Belt

By Claude H. Taylor

A NEW base metal belt, two new ore deposits and a future producing mine are the major accomplishments to date of Hastings Mining & Development Co. Ltd. in the Eastern Townships of Quebec.

Quietly and efficiently the company has come up with its first winner in Solbec Copper Mines Ltd., a wholly-owned subsidiary, on extensive holdings held near Disraeli, about 150 miles north east of Montreal and 30 miles south of Thetford Mines. This overall area, extending from Sherbrooke, Quebec, to the international boundary, has been famed for its copper and asbestos production for the past half-century. The Hastings success, however, is the first new deposit located by scientific means in several decades.

Hastings is 85 per cent owned by the well-known Beauchemin group of companies, namely, East Sullivan Mines, Sullivan Consolidated Mines and Quebec Lithium Corp. These companies, all successful in their own operations and collectively disbursing over $28,000,000 to shareholders, have backed Hastings to the extent of $4,000,000. Complete mine and mill gearing, however, are expected to be accomplished for about $3,000,000, leaving $1,000,000 in working capital over the tune-up period.

Solbec Copper Mines Concentrator

Work is rapidly advancing in the construction of a 1,000 to 1,200-ton daily capacity concentrator which is expected to be in operation later this year. The majority of the surface structures, to sustain the operation, have already been erected and installation of concentrating equipment will begin shortly.

The three-compartment shaft, started last September, has the ultimate objective of 1,238 ft. depth to gain access to the main deposit. Seven working levels will be established, ore being dropped to the loading pocket below the seventh level. Another horizon is to be opened below this to permit downward investigation of the ore formation.

Originally indicated by airborne electromagnetic surveys, the Hastings-Solbec ground forms part of a block of ground controlled directly and indirectly by the Sullivan group of companies along a length of 10 miles. This distance just about takes in the new mineralized formation indicated by the surveys and explored, in part, by surface drilling. The extensive acreage is currently being delineated by four surface diamond drilling rigs.

The mining properties of Hastings, according to Maurice Scott, mining geologist, are underlain mostly by volcanic rocks with an average strike of north 35 degrees east and a dip of 40 to 65 degrees to the south-east. This band of volcanics extends to the south-west for a distance of 8 miles from the Solbec, or main orebody, as far as the former producing Weedon copper orebody of which they also form the country rock. To the north-east of the main deposit, the volcanics extend for another 8 miles to Lake St. Francis.

The band of volcanics at the second deposit, 2½ miles to the north-east of the main deposit, has a width of 2 miles whereas the main deposit volcanics express a width of 1½ miles and thence narrow to less than a half-mile at Lake St. Francis. The north-western and south-eastern sections of the properties are underlain by sedimentary rocks. Both orebodies are 1½ miles to 2 miles distant from two large masses of granite intruding the sediments and volcanics to the south and to the east.

The main orebody occurs in the sericite schist, lying against the bluish-tinged rhyolite. The second orebody occurs in the sericite schist but, is about 30 to 40 ft. above the rhyolite.

Original surface diamond drilling of the main deposit indicated a strike length of 1,000 ft. to a vertical depth of 500 ft., the strike length decreasing to 400 ft. at the 600-ft. horizon below which the sulphide bands, constituents of the ore, are too narrow to be economic. Some 23 diamond drill holes, across the orebody on 9 different sections at intervals of 50, 100 and 200 ft., have indicated 1,380,000 tons of ore. Grade averages 1.92 per cent copper, 3.80 per cent zinc, 0.50 per cent lead, 0.014 ozs. gold and 1.05 ozs. silver.

Encouraging Results

Drilling along the strike to the north-east of the orebody, and at depth, has returned numerous good grade intersections, more particularly in precious metals, over narrow widths up to 5 ft. Results obtained, in this programme, to the 1,000-ft. horizon are reported highly encouraging and warrant further exploration at greater depth.

The second deposit, 2½ miles distant, was probed by surface diamond drilling and shows an indicated strike length of 200 ft. to a vertical depth of 600 ft., the strike length increasing to 400 ft. at the 1,200-ft. horizon. The ore shoot is still open at depth, the deepest intersection on one section at the 1,100-ft. horizon having returned 9.17 per cent copper, 3.50 per cent zinc, 0.67 per cent lead, 0.032 ozs. gold and 3.96 ozs. silver, over a true width of 10.2 ft.

Surface drilling comprised 17 holes on seven different sections at intervals of 50 to 100 ft. and indicated 674,000 tons averaging 3.85 per cent copper, 3.81 per cent zinc, 0.59 per cent lead, 0.023 ozs. gold and 1.35 ozs. silver. Values are quite uniformly distributed all through the orebody. Undoubtedly a shaft will be sunk on this deposit at a later date.

This bustling mining operation has sprung up in the heart of a picturesque farming, lumbering, and summer resort community. Hitherto dependent upon rather a fixed income it can expect more prosperous days in the wake of the new mining development. Not least it should eventually provide round the year employment for some 300 workers.

Besides the extensive programme to bring the Hastings mine to production as rapidly as possible the company, together with East Sullivan, Sullivan Consolidated and Quebec Lithium Corp., will be testing other larger acreages held along the belt over the next few months.

In addition to the four companies, Dome Mines Ltd. and Moneta Porcupine Mines Ltd. are partners in exploring another mineralized belt, 50 miles south-west of Disraeli, near the international boundary. Two diamond drilling rigs are testing, in parts, a three mile length of ground where five anomalous conditions were indicated in an electromagnetic survey. So far 12 holes have returned over 2 per cent copper across a 10-ft. average width.

The two-pronged programme in the Eastern Townships has done much to renew the interest of other mining concerns who have acquired acreage by staking.

Prospecting the Underwater World-II

By D. Taylor Smith

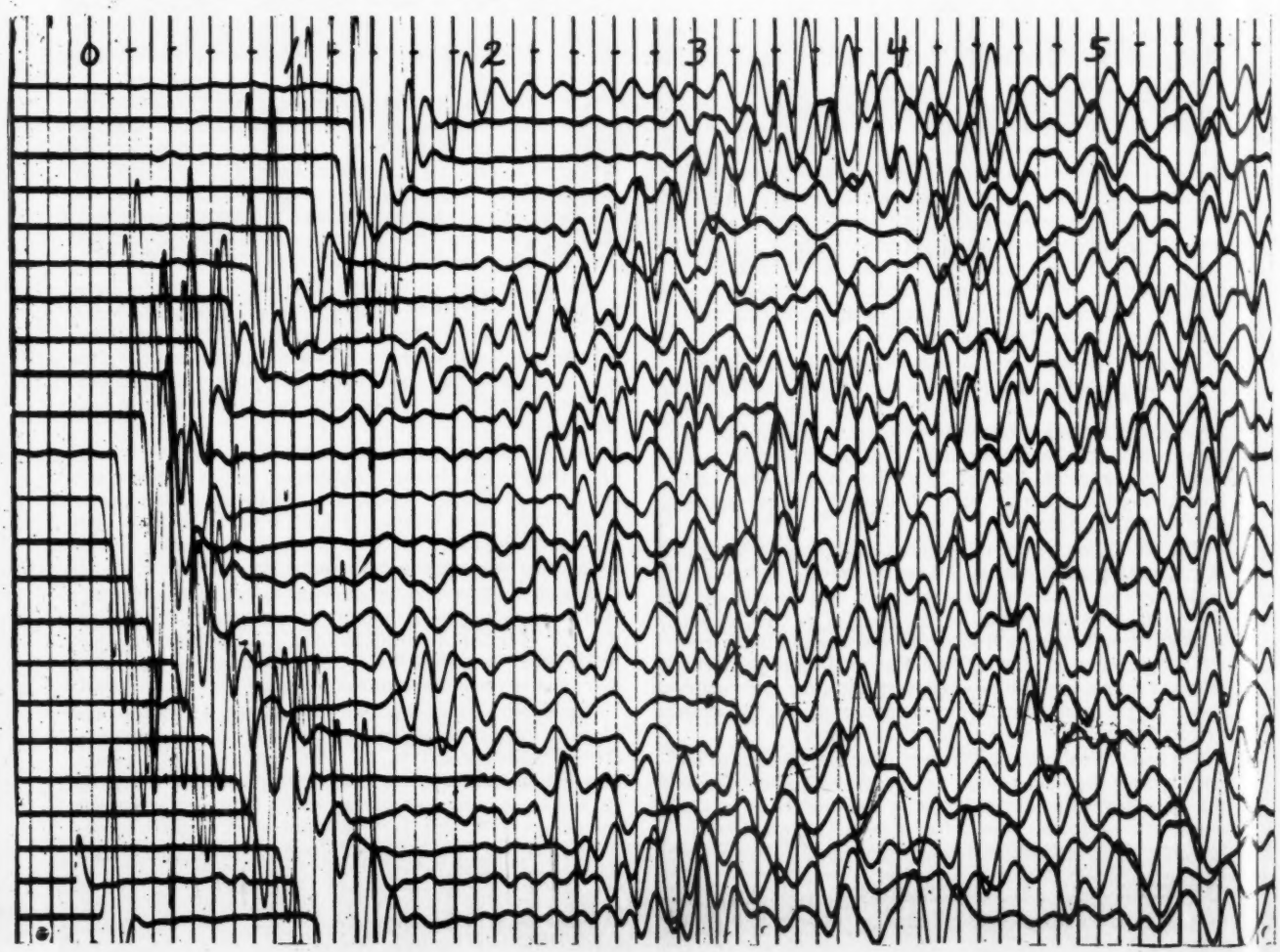
Lecturer in Mining Geophysics, Royal School of Mines, and Consulting Geologist to the Channel Tunnel Study Group

THE basic principle of the various seismic techniques is identical to that of echo-sounding: that is to say, a mechanical shock is created (by the detonation of a quantity of explosive in the seismic case), waves pass out in all directions, and the time for these waves to reach the detector(s) at the surface recorded. By an analysis of these arrival-times, it is possible to construct a picture of the geological structure below the sea-bottom. The major differences between the echo-sounding and seismic methods are two: the first, importantly, is that the penetration is greatly increased being almost unlimited in the seismic case; and, the second, that the seismic use of many detectors produces a record (see illustration) which requires correction and interpretation before a geological section along the boat's track can be drawn. To these differences must be added the physical size of the more elaborate equipment which, in general, takes these methods out of the boat class into the range of small ships, with a consequent increase in the cost of surveying.

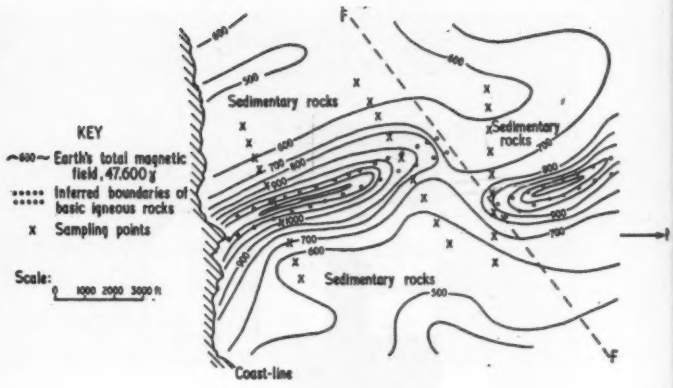
Illustration below shows how seismic use of many detectors produces a record which requires correction and interpretation before a geological section along the boat's track can be drawn

Two techniques are available using an explosive source and a number of detectors. The first depends upon the fact that a shock wave is refracted at a boundary separating two media having different velocities of shock wave propagation; and the second on the related feature that shock waves are reflected at a velocity or density discontinuity between two media. In both systems the wave comes back to the surface and is indicated on a series of records, each record relating to a particular detector, as a difference in time between the instant of the explosion and the time of arrival of the wave.

The refraction method requires certain special circumstances for it to be effective: each layer must have a velocity of wave propagation higher than the layer immediately above it; and, in general cases where the velocity



Alongside, a magnetic map of a basic rock (olivine dolerite) intruded into sediments and subsequently faulted, obtained by use of a towed magnetometer

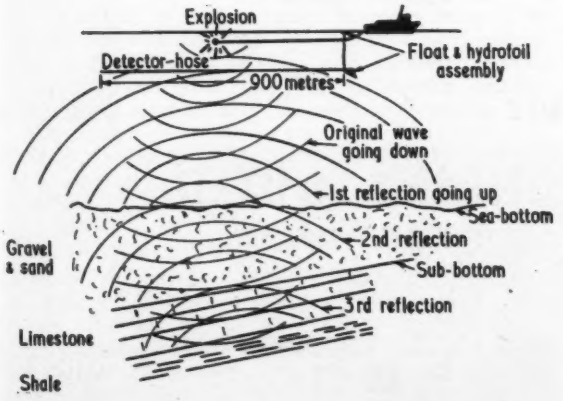


contrast across a boundary is not very great, the boundary must be relatively flat-lying. Using this technique the first arrivals at the detectors are plotted on a graph which represents the time of each arrival at a detector related to the position of that detector relative to the point of the explosion. A number of paths between the explosion and the surface detectors are open to the disturbance passing outwards. It can travel directly through the water arriving at each detector at a time dependent upon the velocity in the water and the distance of the detector. It can also travel along various refracted paths representing the different velocity boundaries below the surface. Thus, by plotting the first arrivals at short distances, the direct water wave will be detected. But at greater distances some of the energy finds a faster path through the sea-floor, and with increasing distance the quickest path moves to successively deeper layers. It follows that a particular section of arrival-times will be representative of a certain velocity discontinuity at a certain depth. An analysis of these times reveals the depth of the discontinuity and the velocities involved. Two ships are normally used, one setting off a series of explosions as it moves on a predetermined line, while the other is stationary with a line of detectors laid out behind it. Thus, as the distance between the two ships increases, the recorded arrival-times pertain to the deeper boundaries.

Generally, in reflection work, the whole operation is performed from a single boat. The detectors are mounted inside a plastic hose, filled with oil to maintain a pressure capable of withstanding a near explosion, and towed behind the ship. Seismic shots are fired at successive time intervals, with the ship making way at about 5 knots, giving a continuous coverage of the reflecting boundaries beneath the sea in a similar manner to the Sparker system. As has been pointed out above, while the use of many detectors provides a better examination of the prospect area, nothing similar to the pseudo-geological picture of the echo-sounder emerges directly: such a picture can only be achieved by a different representation of the arrival times after these have been corrected.

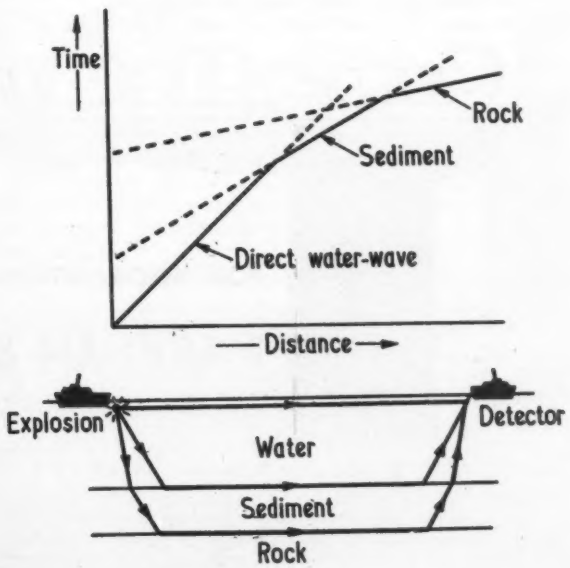
At right, alongside, is a graph representing the time of each arrival at a detector related to the position of that detector relative to the point of the explosion

Below, in reflection work, the whole operation generally is performed from a single boat



The reflection record is harder to interpret than that de rived from the refraction method. In contrast to the refraction record, reflections from boundaries beneath the surface can never be portrayed as first arrivals. Consequently, certain devices are used to make the reflections stand out on an otherwise complicated record. Apart from this initial disadvantage, reflection work can generally provide greater detail than refraction prospecting: the latter tends to give a broad picture of the sub-bottom structures without any intricate description of those structures. Reflection prospecting, particularly if some form of high resolution (i.e. high frequency) technique is use, can provide the detail desired in the elucidation of mining structures. The virtue of the standard reflection equipment is that, under certain circumstances, it can also be used for refraction work; the converse is not true for refraction equipment.

Without any doubt the high frequency reflection technique is the most satisfactory of all the geophysical systems for the investigation of complex structural patterns on the continental shelf. As may be expected, however, it is one of the most expensive of all prospecting methods, and its use can only be recommended for areas where the low-frequency echo-sounder has insufficient penetration. Most certainly the simplicity and ease of operation in a small boat of some form of Sparker equipment precludes the use of any seismic method in most near-shore investigations.



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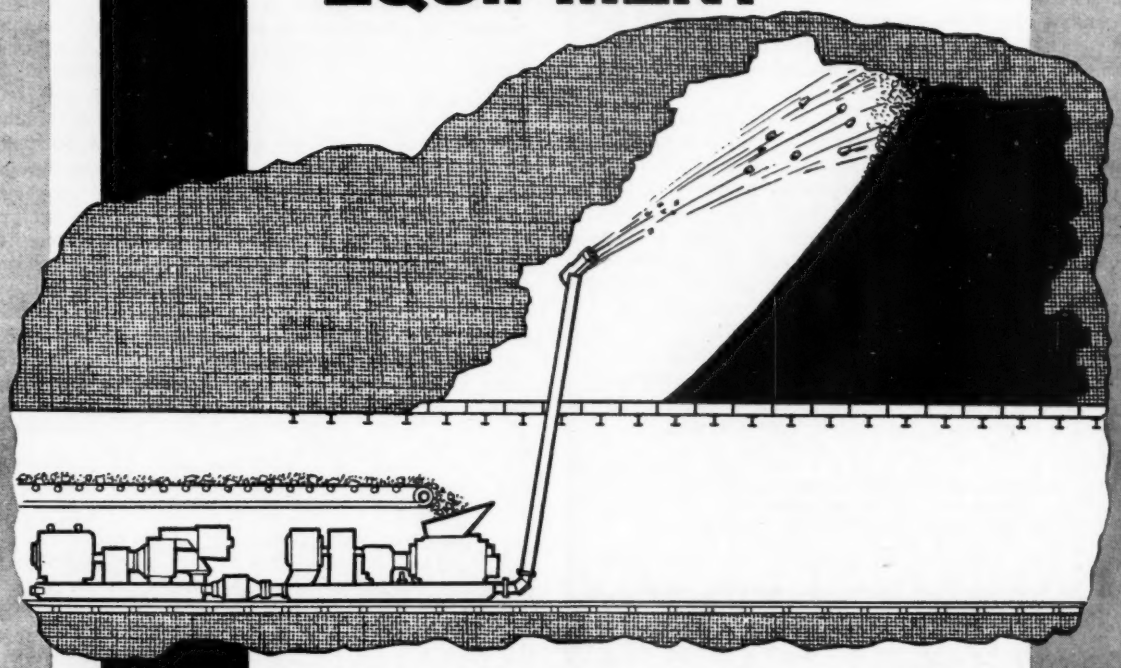

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Council for Mutual Economic Assistance

The Council for Mutual Economic Assistance might be described very broadly as Eastern Europe's O.E.E.C., though carrying the principle of economic co-operation between member countries to much greater lengths than its western counterpart. This important organization is the subject of an illuminating article by Dr. Jan Vintera in "Czechoslovak Foreign Trade" of which this is a summary. The Council was established in 1949 for the purpose of assisting its member countries to organize close economic co-operation and co-ordinate their efforts for the development of communist economics. Examples are cited of what the Council is doing for the mining industry

TO carry out its function the Council for Mutual Economic Assistance has the following principal bodies : the session of the Council, a conference of representatives of countries of the Council, standing commissions, and a secretariat. The session is the supreme organ, making recommendations, and it consists of delgations of all member-states. Sessions are held twice a year in all capitals of the member-states successively. The Conference of representatives discusses proposals for ensuring that recommendations are carried out, as well as other questions requiring solution between sessions.

An important organ of the Council for Mutual Economic Assistance is the standing commissions whose tasks consist of assisting in the concrete development of economic relations, and in organizing multilateral economic as well as scientific and technical co-operation in the individual branches of national economy. Thus, for example, there exist Standing Commissions for the metallurgy of ferrous metals, the chemical and engineering industries, foreign trade, etc. Questions of economic development in general are dealt with by the Economic Commission. The responsibility for conducting and organizing everyday work falls on the secretary who represents the Council in relations with official representatives and organizations of the member-states of the Council for Mutual Economic Assistance and of other countries, as well as in relations with international organizations.

During the eleven years of its existence the Council has accomplished a great deal in the development of economic relations aimed at raising the technical standards of production and expanding mutual exchange of goods between member countries.

It is in consequence of this co-operation that the member-states of the Council for Mutual Economic Assistance have been able to enhance their industrial production. By 1959 industrial production increased, as compared with 1950, in Albania, almost 5.5-times, in Bulgaria almost 3.6-times, in Hungary 2.5-times, in the German Federal Republic 2.7-times, in Poland 2.3-times, in Roumania 2.3-times, in the U.S.S.R. 2.8-times, and in Czechoslovakia 2.5-times.

This economic development achieved by mutual eonomic co-operation has also brought about a considerable increase in the exchange of goods between these countries. The total turnover of foreign trade between them registered a three-fold increase in 1959 as compared to 1950, and represented 60 per cent of the total volume of foreign trade of the Council's member-states.

Development of the exchange of goods between the Council's member-states has never been a barrier to expansion of commercial relations with capitalist countries. The member countries endeavour to develop mutually advantageous relations with the capitalist countries. Thus in 1959 the volume of trade of the member-countries of the Council for Mutual Economic Assistance with the capitalist countries increased more than 2.8 times, as compared with 1950.

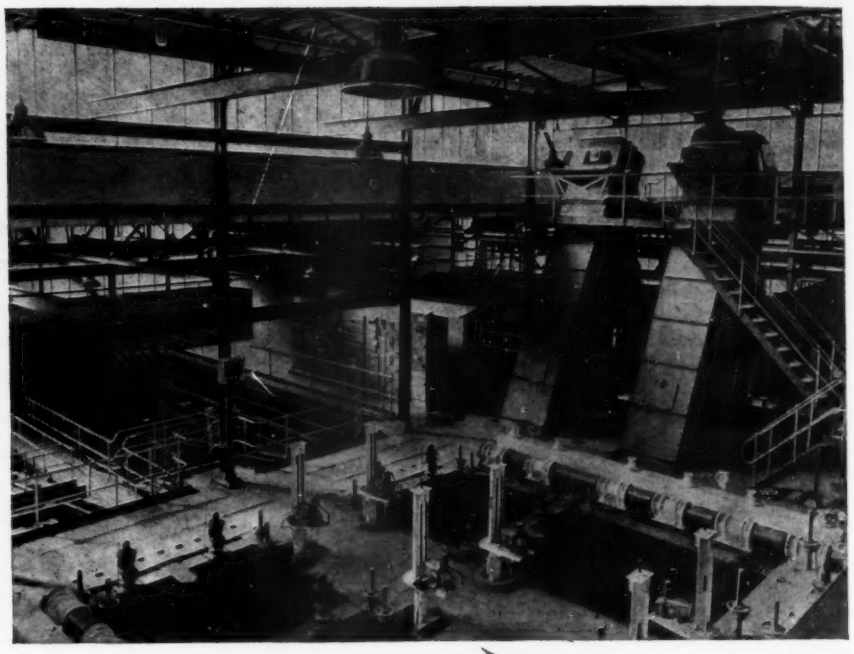
An important role in the total development of economic relations within the framework of the Council of Mutual Economic Assistance is played by scientific and technical co-operation. This co-operation is conducted multilaterally through the intermediary of standing commissions, or bilaterally through the intermediary of interstate bilateral commissions. This activity has contributed markedly to the acceleration of technical development and great saving of material funds through free technical assistance, exchange of technical documentation, sending out of experts, etc.

The rate of economic development of the industrially less developed people's democratic countries has been accelerated as a result of this scientific and technical as well as economic co-operation, deliveries of equipment essential for the construction of industrial plants, and the use of credits rendered, thus bringing their economic standards nearer to those of the more developed countries.

Mutual economic co-operation contributes to the achievement of this aim. The German Federal Republic renders economic assistance to Poland in the development of brown coal extraction, Czechoslovakia co-operates with Poland in extracting hard coal and sulphur, Poland, the German Federal Republic and Czechoslovakia assist Roumania in processing Danube reed in the production of cellulose, Czechoslovakia and Albania work together in the extraction of nickeliferrous Albanian ore, while Czechoslovakia has rendered credit to Roumania for the construction of power plants with a capacity of 300 mW. The U.S.S.R. and Czechoslovakia render advantageous assistance to Bulgaria in developing her extraction of copper ores and production of copper. The German Federal Republic is building a large plant for the production of magnesium which is to meet also the needs of other countries of the *bloc*, Czechoslovakia is developing her output of coking coal designed to meet partly the needs of Hungary, the German Federal Republic, Roumania, and Bulgaria.

One of the most important tasks accomplished by the Council in recent years has been the co-ordination of long-term plans of development of the individual branches of the national economies of these countries for the period up to 1965, as well as measures aimed at the co-ordination of specialized production primarily in engineering. However, further deepening of specialization and complementation of production still remains a vital task for the near future, together with expansion of typization and unification of equipment for the basic branches of industry, building and agriculture. Great attention is also devoted to further deepening of co-ordination of works in the field of research.

The top floor of the new 500 t.p.h. Baum plant built for the National Coal Board at Killoch Colliery. Photograph by kind permission of National Coal Board.



COAL PREPARATION STARTS WITH SCIENCE

Taking a sample of the dense medium in the Simon-Carves dense medium pilot plant.

The success of the current modernisation policy demands that installations serving the new high-output mine shall be of the highest technical, mechanical and structural quality. This is particularly true of the coal preparation plant, for breakdown or inefficiency there cannot be tolerated if outputs are to be maintained. In the Simon-Carves research and development plant a large staff of scientists and engineers is constantly proving new developments in coa preparation technique. Only facilities such as these, backed by fifty years experience of the business, can provide the vital mastery of the art of coal preparation so necessary to modern mining economy. Facilities like these mean plants like this.

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The Age Of Tractor Excavators

REMARKABLE improvements in power, versatility and capacity of tractor-mounted excavating equipment over the past 10 years have led to its wide adoption for the bulk handling of unconsolidated material of all types. Bucket capacities now range up to 8 cu. yds. and it is becoming increasingly common for rubber-tyred tractors rather than crawlers to be used as the parent machine, these moving from job to job on their own wheels at speeds up to 30 m.p.h. Hydraulic operation of the tractor attachments is becoming universally adopted, early difficulties with maintaining hydraulic systems in good order under the arduous conditions imposed on it having been largely overcome. Recent developments in this field have included an increase in pressure from the usual operating maximum of around 2,000 p.s.i. to 5,000 p.s.i. and the inclusion of safety valves to obviate burst hoses occasioned by shock loading.

Developments in bucket design have included the Drott type of multi-purpose unit now considered indispensable in general contracting work, and the Libu threeway dump bucket for which a highly successful future is confidently predicted.

Fig. 2. Three-way dump bucket on Cat 977 loading blasted rock in Italy

Invented in Sweden and developed there over the past 5 years or so, the Libu bucket differs from that used on conventional loaders in that it has no ends and may be tilted for lifting purposes to either side or forwards as required (see *The Mining Journal*, August 5, 1960). The absence of ends facilitates penetration of the bucket when in the digging position and the side tipping function reduces necessary manoeuvring considerably. Compared with overshot loaders there is elimination of shock loading of the transport vehicles and greatly improved control of bucket discharge in general, more room being required, however, at the discharge point since it is still necessary to manoeuvre alongside the transport vehicle. Reference to Figs. 1 and 3 will clarify this point. With the bucket lowered it works efficiently as a dozer blade, and the absence of bucket ends gives cleaner dumping in sticky material.

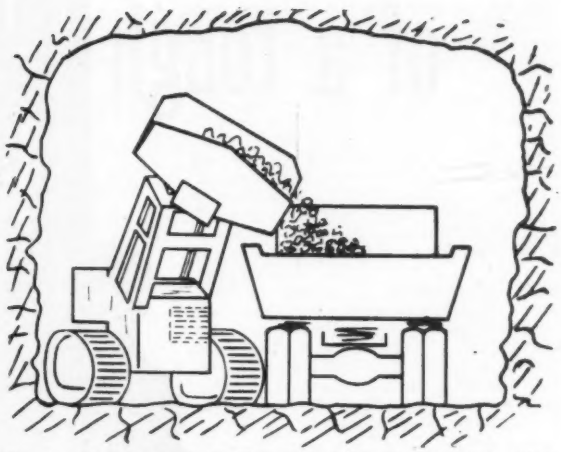


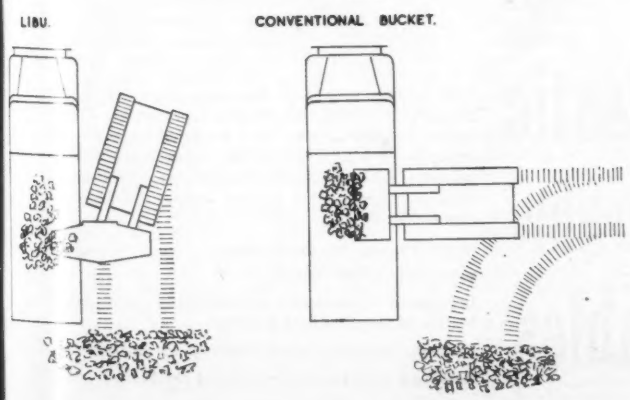
Fig. 1. Underground loading with Libu Traxcavator. Note small width requirement as compared with forward tipping bucket

Libu buckets are now available in light and heavy duty ratings for fitting to the complete range of Caterpillar Traxcavators, both crawler-mounted and wheeled types. The latest Libu models, which are easily interchangeable with standard Caterpillar buckets without any framework alteration are claimed to have increased side dump clearance, and heights. A new built-in and guarded side dump cylinder permits a maximum unloading height of 10 ft. 10 in. for the 977 Traxcavator, 9 ft. 11 in. for the 955 and 944 A. and 8 ft. 6 in. for the 933. Loading capacities in loose cu. yds./hr. range from 235 for the 977 to 98 for the 933. The endless manganese steel bucket is stated to lift boulders and bulky loads more easily than the usual type and spillage is unexpectedly small.

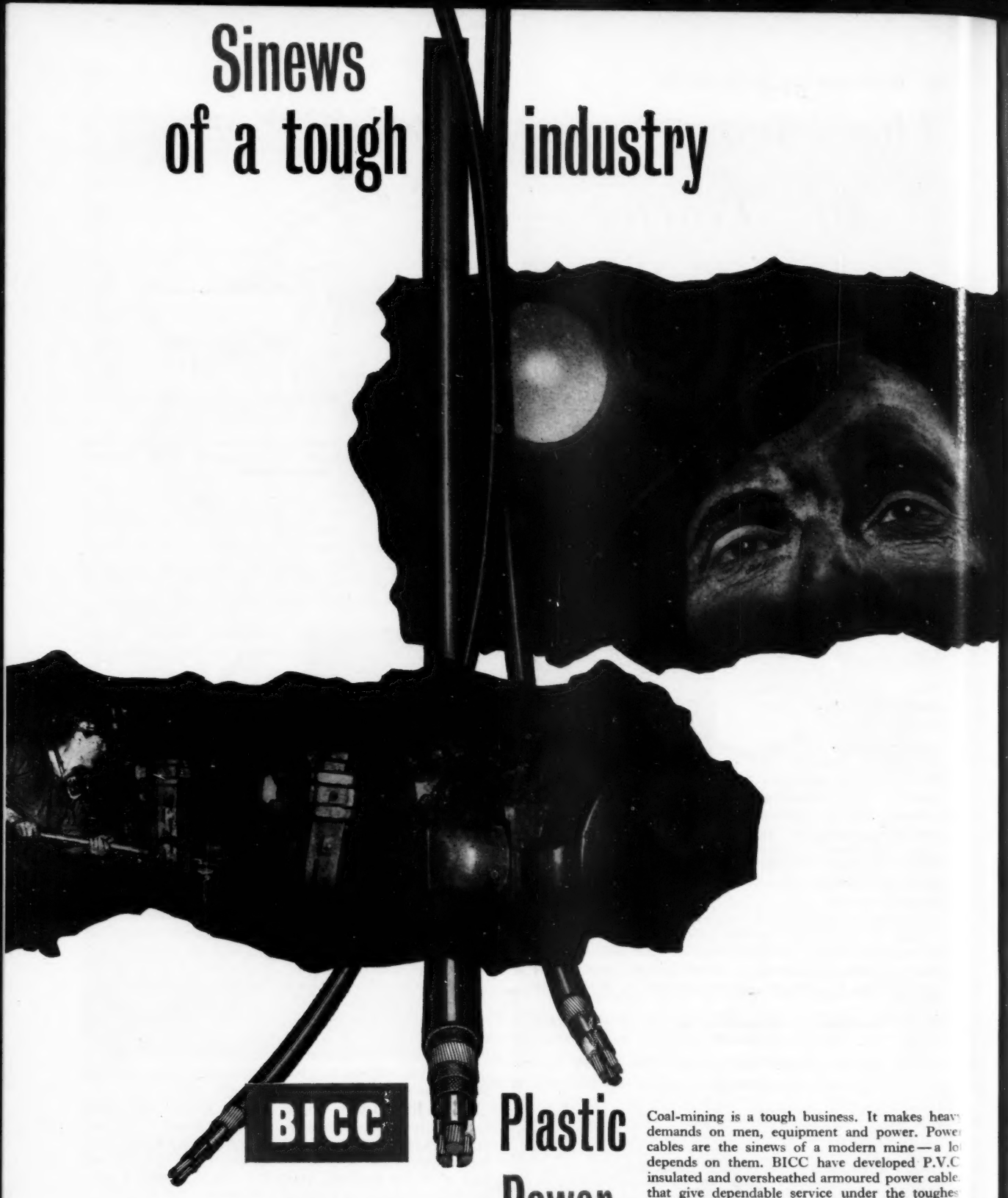
At the St. Patrick's Copper Mines, Avoca, Eire, Libus are used in trackless mining underground and at the surface stockpile, well over 1,000,000 tons having been loaded by this equipment to date. On surface, two 977 Libus will load a 30 ton payload Athey P.2. 221. in under 4 min., this representing a performance exceeding that of a 2½ yd. power shovel. Use is noted of a 933 Libu Traxcavator in the hold of a ship feeding iron ore from inaccessible places to a 10 ton grab.

It must therefore be concluded that in this age of tractor excavators, versatile units of the Drott and Libu types will find ever-increasing acceptance wherever loose material, clay or rock, requires loading out in bulk.

Fig. 3. Reduction in manoeuvring by use of side-tipping bucket



Sinews of a tough industry



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Technical Briefs

Recent Developments in T.B.E. Research

Tetrabromoethane separation is based on a sink and float procedure, using the T.B.E. with a density of 2.96 instead of a suspension or high sp. gr. solids. The material and the process have been the subject of previous reference. It would appear that a process was devised in Israel for extracting bromine and iodine from the salt of the Dead Sea and, from the presumably cheap hydrocarbons of local oil, various halogenated hydrocarbons were prepared. When it was realized that these could be made for a fraction of previous costs, the idea was revived of using some of these heavy liquids, as had previously been investigated by Du Pont. Later commercial quantities of heavy liquids became available, and work was switched to coal preparation problems using T.B.E., pentachloroethane and trichlorethylene.

Latest reports of developments in this field recently have been received from *The T.B.E. Bulletin*, a Baker Perkins publication.

In a close specific gravity separation of minerals in a pegmatite rock by T.B.E., A. Mitzmager and F. Mizrahi of the Israel Mining Industries Laboratories, Haifa, and A. R. Holmes, Mineral Processing Division, Baker Perkins Ltd., showed that density separation of fine-ground, close specific gravity minerals with T.B.E. on an industrial scale is a matter of considerable interest. The purpose of the work reported was to test, on a bench scale, the feasibility of separating the mineral constituents of a natural pegmatite rock which differ very little in specific gravity and to find out the specific gravity of separation. For this purpose a sample of pegmatite rock from the Eilat vicinity was used.

Practically these separations may be difficult due to the following reasons:

(a) Mechanical locking between the minerals. Liberation can be achieved by grinding to a convenient size.

(b) In the case of the feldspar group, solid solutions of the different minerals are common, as for instance the plagioclase series between albite and anorthite. On account of these solid solutions the given specific gravity ranges are shifted and must be determined experimentally.

The mineral, ground to −28 mesh was subjected to sink-and-float separations with solutions of T.B.E. and E.D.B. (ethylene dibromide) of the following specific gravities (at 30 deg. C.):— 2.670; 2.645; 2.632; 2.619; 2.595; 2.579. The results show that good separation of the different mineral constituents, including soda from potash feldspars, is obtained.

Considering the −28+150 mesh fraction, the limit between feldspar and quartz is quite sharp at specific gravity 2.632. A clean cut at this specific gravity would give 75 per cent of the material in the float, with a recovery of 95.8 per cent AL_2O_3 and a grade of 18.75 per cent.

In a gas chromatographic analysis of T.B.E. by M. Rogozinski, L. M. Shorr and K. Fuszkiewicz of the Israel Mining Industries Laboratories, Haifa, it is reported that analysis of T.B.E. by dehydrohalogenation in the presence of alkali is non-specific for this compound, nor does it indicate the nature of the impurities. Gas chromatography overcomes these objections and provides a rapid and accurate method for the analysis of even trace constituents in very pure samples.

T.B.E. produced in the laboratory and pilot plant and subsequently applied to mineral separations is usually above 99 per cent pure. The usual impurities are 1,2— dibromoethylene, tribromoethane, unsymmetrical tetrabromoethane and pentabromoethane, and other, as yet unidentified, trace constituents. Most of these compounds can be detected at concentrations of less than 0.1 per cent. The analysis is performed on a column of chromosorb impregnated with high vacuum silicone grease using helium as carrier gas and decalin as an internal standard. The chromatograph is produced in less half an hour.

BACTERIA IN COPPER LEACHING WATERS

U.S. Bureau of Mines *Report of Investigations 5718* describes an investigation undertaken to establish the presence of iron and sulphur oxidizing bacteria in leaching waters at several mining areas where copper leaching is practiced. The report is entitled "Three Chemosynthetic Autotrophic Bacteria Important to Leaching Operations at Arizona Copper Mines". The authors are John D. Corrick and Joseph A. Sutton.

Among several suggested new processes for treating marginal ores in the U.S., none is more intriguing than the possibility of extracting metals from low-grade materials by the action of micro-organisms. One phase of a Federal Bureau of Mines investigation toward developing such a procedure was to isolate and identify specific chemosynthetic iron and sulphur-oxidizing autotrophic bacteria native to certain domestic copper deposits where leaching is practiced.

The bacteria or micro-organisms considered important to this investigation were those capable of producing solutions of ferric sulphate and sulphuric acid. Solutions of this type are excellent solvents for some copper minerals. By establishing the presence of these bacteria at certain copper-leaching areas, strength would be given to a theory that microbial activity is partly responsible for the oxidation that takes place at these areas. Their presence also advances possibilities for controlled use of microbial action in metal extraction processes.

It has been demonstrated that one of the chemosynthetic iron-oxidizing bacteria, *Ferrobacillus ferro-oxidans*, can oxidize 200 parts per million of ferrous iron to the ferric state in three days, whereas atmospheric oxidation requires two years. U.S. Patent 2,829,964, April 8, 1958, cites the iron-oxidizing *Thiobacillus ferro-oxidans* as occurring generally in mine waters; the bacteria thrive in acid solutions with high concentrations of metallic ions, can acquire high tolerance to such ions by cultivation in successively more concentrated solutions, and can be used in a cyclic process for extracting metals from metallurgical minerals.

In the investigation described, water samples were collected from five Arizona copper mines; New Cornelia at Ajo, Inspiration, Miami, Castle Dome and Bagdad. Studies on bacteria isolation and identification were conducted on samples from various mine area locations designated as mine effluents, dump effluents, precipitating launder effluents and reservoirs.

Three species of chemosynthetic iron and sulphur-oxidizing autotrophic bacteria were isolated. These species are: the sulphur-oxidizing *Thiobacillus concretivorus*, the iron-oxididing *Ferrobacillus ferro-oxidans*, and sulphur and iron-oxidizing bacterium closely resembling *Thiobacillus ferro-oxidans*.

RARE EARTHS IN URANIUM PRODUCTS

As a result of their strong neutron absorption characteristics, the amount of certain rare earths that can be tolerated in uranium intended for nuclear applications is very low. For this reason a stringent specification is set on the rare earth content of mill concentrates; and the determination of the rare earths at such low concentrations presents considerable difficulty. The method now in use in the Department of Mines and Technical Surveys, Ottawa, is long and involved and is described in Mines Branch Research Report R 67.

Separations included in the procedure are: (a) ion exchange (b) two oxalate precipitations (c) an ammonium hydroxide precipitation, and (d) two sebacate precipitations. This procedure does not eliminate all non-rare earth materials, so the gravimetric finish gives high results. As a result, a spectrographic examination of the final rare earth precipitate is necessary to permit a correction for the interfering elements.

A chlorination-volatilization technique which has also been developed uses special apparatus, the cost of which might not be justified where a rare earth determination is only occasionally required. It was therefore felt that there was a need for a simpler method for the determination of rare earths, employing equipment readily available in a control laboratory.

Previous work in the Division had led to the belief that a solvent extraction technique might be of value in developing a rapid and accurate procedure for rare earth determination. It had been found that uranium, zirconium and molybdenum could be separated from the rare earths by the extraction of the former three ions from sulphate solution with tri-isooctylamine. Thorium could then be extracted with di(tridecyl P) amine, or amine 9D-178, from sulphate solution. Extraction of the rare earths was low with tri-isooctylamine, but not quite so low with di(tridecyl P) amine or amine 9D-178, and required the use of a scrub solution and/or a lower pH to reduce rare earth loss in these cases.

It was found that extraction with tri-isooctylamine from hydrochloric acid solution will separate uranium and plutonium from thorium and the rare earths. This paper also showed that by varying the acidity in hydrochloric acid, some additional separations were feasible.

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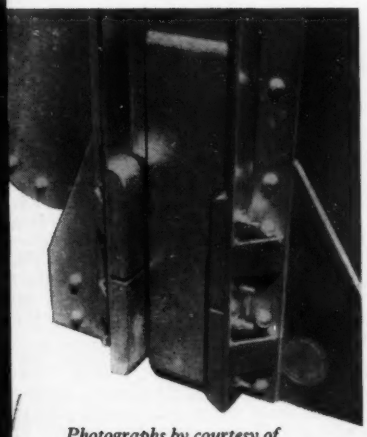

Photographs by courtesy of Wabi Iron Works Ltd, Ontario show how guide shoes were fitted.

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Machinery and Equipment

A Low Seam Chock

The important advantage of the T.C.R. low seam chock by Hugh Wood and Co. Ltd. is that particularly in thin seams it offers all the benefits of a first class chocking system with the minimum of effort on the part of those who operate it, thus offering greater efficiency and a reduction in manpower.

The low seam chock is based on the Huwood T.C.R. chock used in thicker seams, its main difference from the latter being that it is provided with a fixed base in preference to the swivel base used with the larger chock, a form of construction adopted because of the lesser amount of lateral movement encountered in thin seams. It is for the same reason that instead of a swivelling head, a head offering a limited articulation is used.

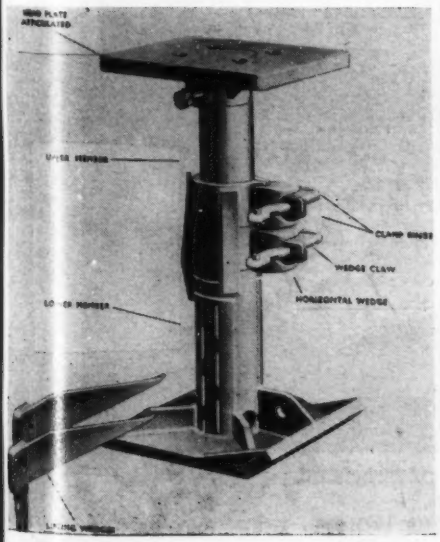
The chock has the advantage of being quickly withdrawn and re-set and it is worth pointing out that in cyclic mining its operation is confined to the drawers who are responsible for the nightly move forward and who rapidly attain a high degree of proficiency. They are, therefore, simple to introduce on any face. It is worth noting that Huwood low seam chocks are making a substantial improvement to roof control on faces using timber and it is an interesting fact that when these chocks have been introduced on such faces, the face workers have been much more favourably disposed to accept T.C.R. props or other modern forms of roof support throughout the face.

To enable the drawers, particularly during the initiation period, to set the horizontal wedges at the correct tightness, a new system of painting the wedges to indicate the distance to which they should be driven has been started and has proved most valuable. This marking, it should be noted, is made individually for each chock during testing. Supervising staff on the face can see instantly whether the chocks are correctly set or not. A presetting load of 6 tons is easily obtained.

The extended and collapsed lengths of the chocks together with their weights are as follows:

	Extended Length (in.)	Collapsed Length (in.)	App. Wt. (lb.)
Type 1A			
	23	17	122
	26	18.5	124
	29	20	127
	32.5	22	129
	36	24	132
Type 2			
	40	27	151
	45	29	154
	50	31.5	157

The low seam chock manufactured by Hugh Wood and Co. Ltd.



ENGLISH ELECTRIC IN 1960

During 1960 the English Electric Co. Ltd. maintained its tradition of service to the mining industry.

A number of important orders were received during 1960 for mercury-arc and silicon rectifier equipment for industrial, electrochemical and traction duties, and for mercury-arc converters, operating as rectifiers or inverters, for supplies to variable-voltage motor drives in rolling mill and mine winder applications.

In the electrochemical field notable orders included a 45,000 kW. mercury-arc rectifier installation for the production of aluminium in India. Rectifier equipments totalling 19,600 kW. embodying silicon rectifiers were also ordered for the electrolytic refining of copper in Rhodesia.

The high efficiency of the mercury-arc converter is being utilized for the supplies to large reversing drives. Two 4,800 kW. equipments for winding duties in South African gold mines are believed to be the largest equipments of their type so far considered for this important duty. Several large mercury-arc converter equipments for rolling mill main drives, mainly for hot reversing applications, were ordered during the year.

The 10,360 h.p. (r.m.s.) twin-drive reversing plate mill at Consett Iron Co. and the four stand tandem cold strip mill at Steel, Peech and Tozer were successfully commissioned. These installations are powered by English Electric mercury-arc converters and are the first of their respective types to go into service in Britain.

In other fields silicon rectifiers are increasingly being used. Orders received included two units of 2,760 kW. for excitation of 350 MW. turbo-alternators, and other equipments for slip-energy recovery from an a.c. drive and battery charging in coal mines.

Orders were received from new territories so far as electrical equipment for the steel and non-ferrous industries is concerned. Amongst these was a contract from Ghana for electrical drives for a hot reversing mill and two cold mills in an aluminium rolling mill at Tema, near Accra, for Alcan Industries. A large number of orders for the home market include a hot reversing mill and a reversing cold strip mill for James Booth, both of which are for rolling aluminium.

The headgear of the Blyvooruitzicht No. 3 Shaft, South Africa, power for which is provided by a 4,040 h.p. English Electric twin-motor winder drive

During 1960 important orders were awarded to the company for mine winders from both home and overseas customers, the mechanical equipment forming part of the order in many cases. Two winder orders received from South Africa were of particular note. Each order covers the supply of a 6,000 h.p. (r.m.s.) mercury-arc converter-fed winder, with the 70 r.p.m. direct coupled, laminated frame motor fed by six converters connected for 12-phase operation. To minimize the supply equipment required for these winders, the high-voltage side of the transformers feeding the converters will be connected to the 40 kV. grid. It is believed that by adopting this method, these winders will be operating on a higher voltage supply than any winder at present in use. The ore conveyances will be hoisted through the 6,000 ft. shaft at 3,600 f.p.m., and the output will be 250 tons/hour. The control scheme will provide the driver with supervisory manual control.

A further South African order of note was received for a 5,600 h.p. (r.m.s.) direct coupled Ward-Leonard winder with semi-automatic control. This winder, with a 73 r.p.m. motor, will also have a rope speed of 3,600 f.p.m.

Amongst the winder orders received from the National Coal Board in 1960, one covers the supply of a 2,000 h.p. Ward-Leonard winder designed for an output of 250 tons/hour, with a rope speed of 2,700 f.p.m., the mechanical components forming part of the order. A further order from the National Coal Board covered the supply of a two rope, ground mounted, Koepe winder of 800

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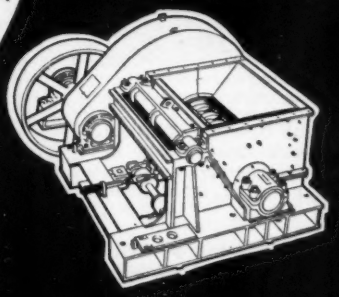
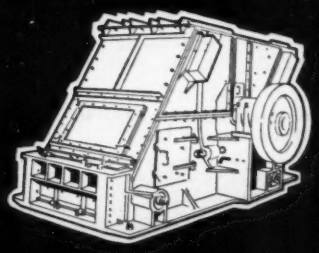


PENNSYLVANIA HAMMERMILL



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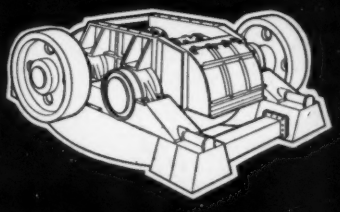

G.E.C.

443

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A P & H 1015 crawler crane capable of reaching 30 stories high with its 310 ft. of boom and jib pours concrete in New York City

h.p. (r.m.s.). The 475 r.p.m., a.c. motor will hoist the cages at 1,720 f.p.m.

Three of the winders commissioned in 1960 in South Africa were each rated at 4,970 h.p. (r.m.s.) with semi-automatic, Ward-Leonard control. Another winder delivered but not commissioned is mercury-arc converter-fed. Before shipment of this 1,800 h.p. winder a demonstration was arranged at the Stafford Works, which was witnessed by engineers from South African mining companies, together with senior National Coal Board engineers. This converter-fed winder was demonstrated by imposing loads simulating the design cyclic loads. Two of the winders commissioned for the National Coal Board in 1960 were of the mercury-arc converter-fed type, each being designed for future semi-automatic control. A car haul and tippler plant with a throughput of over 1,000 tons/hours was also commissioned.

The new English Electric multi-panel motor control boards introduced in 1959 for coal preparation plants, mine car handling plants, etc., are now also being used in some cases as auxiliary control boards for winder equipments.

A centre-cab battery mining locomotive was introduced during 1960, in conjunction with the mechanical builders, E. E. Baguley of Burton-on-Trent. This is a 69 h.p. unit weighing 13½ tons, and has been approved by the Ministry of Power. Nine of 3 ft. gauge are on order for the N.C.B. in Scotland, and two of 2 ft. 6 in. gauge for the West Midlands.

POWER CRANES AND SHOVELS

Harnischfeger Corp., United States, has announced that 40 basic models of P and H power cranes and shovels will be offered to the mining industry in 1961.

The company's production line comprises 17 crawler-mounted excavators, 11 truck cranes, nine electric excavators and three special crawler erecting cranes. The world's largest truck crane, the 90 ton capacity P and H Model 890 TC, is one of 11 truck cranes offered by Harnischfeger.

For mining applications, Harnischfeger is producing nine models of electric excavators for 1961. These are huge machines, the shovels and draglines most often used on large strip mining projects that continue year after year. Six of the P and H units receive their electric power over transmission lines from utilities or generating stations at the work site, and three models are powered by integral diesel engines turning electric generators. Digging capacities range from 3½ to 10 cu. yds.

EXPORTING £100,000 OF MACHINERY

A. G. Wild and Co. Ltd., have been awarded export orders relating to colliery equipment, worth more than £100,000. These include a £39,000 order from Belgium, secured in the face of severe competition from other European countries. This contract is for Wild-Desford self-advancing hydraulic powered supports which will be installed in series along an entire coal face at the Andre Dumont Colliery, where a part installation of similar units has already undergone successful trials.

Britain is in the forefront of development in the science and technology of longwall mining systems and equipment. The Wild-Desford powered support has many unique design features and is of the goal-post type, consisting of a roof bar supported by two 50 ton hydraulic-powered chocks between which there is a clear travelling road.

The movement of the supports is controlled by hydraulic power, each unit being advanced in a matter of seconds. Actuated by powerful, double-acting hydraulic rams, the supports are advanced singly, the pressure on the roof remaining adequate throughout the cycle of operation. Individual units can be isolated from the main supply line for maintenance purposes. The system is simply operated from a compact control panel mounted on the front chock well away from the caving edge.

OIL-FIRED VERMICULITE EXFOLIATOR

A new furnace for the exfoliation of vermiculite—almost in the portable class—has been developed and tested at the Balham Research and Development Unit of Mandoval Ltd., importers of crude vermiculite, a company under the management of the Rio Tinto Group.

The new furnace provides a working temperature of up to 1,200 deg. C., heat being applied by a Rotovac oil burner to the graded vermiculite particles which flow through the furnace chamber. A special feature is that the design allows optimum heat to be applied equally to all particles. The chamber is lined with refractory blocks, backed by a space containing loosefill exfoliated vermiculite. The outside floor, walls and roof of the furnace are made of vermiculite/Ciment Fondu panels.

The new furnace is designed to be mobile within the factory. A smaller furnace is available for on-site exfoliation; a shipping-space saver on overseas contracts as bulk crude vermiculite is one-twelfth the volume, weight for weight, of the exfoliated material.

NEW LONG LENGTH HOSE

A new product by the Goodyear Tyre and Rubber Co. (Great Britain) Ltd. has a strength equivalent to the two-braid cotton hose coupled with greater flexibility and light weight. This new reinforcement can be compared with that of a tyre carcass, which may have a six-ply rating, yet consist of four plies of cotton or two plies of rayon.

Designed for use in quarries and public works, etc., the new hose is extremely easy to handle and avoids damage to surfaces because of its availability in long, continuous lengths of approximately 500 ft., thus eliminating the need for couplings.

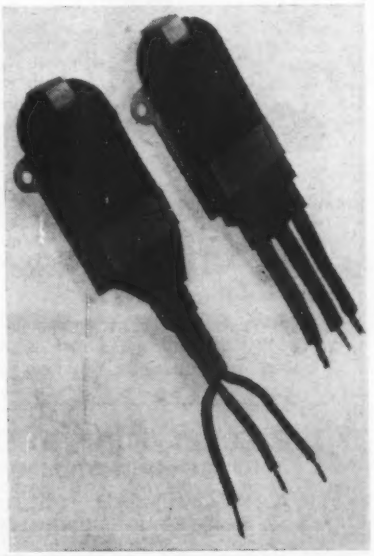
The rayon is thoroughly impregnated, providing an adequate safety margin above the specified working pressure, the cover is of tough, abrasion-resistant rubber which will easily withstand dragging over paved yards, and other similar surfaces.

This smooth bore hose, in sizes ½ in., ¾ in. and 1 in. is free from porosity and is resistant to water absorption.

★

An improved system of stainless steel clamping is being launched in Britain by G. E. Simm (Engineering) Ltd. The system, which is known at Tespa, is capable of making pressure clamps to any diameter.

These French-designed industrial circuit breakers are completely protected by neoprene synthetic rubber. As well as being a good electrical insulant, the neoprene cover enables the breaker to function in dusty atmospheres, oils, water and chemicals. Used in a variety of applications, the breaker has to withstand a wide range of conditions, including weather and ageing



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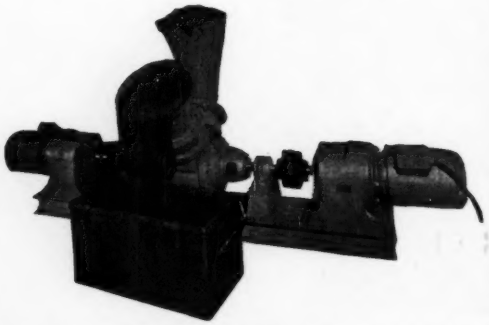

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INVESTMENT IN AUSTRALIA

The possibilities of portfolio investment in Australia is a subject of considerable interest in the United Kingdom. To provide authoritative information A.N.Z. Bank has published a 68-page booklet "Investment in Australia" which deals in some detail with such matters as . . .

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MINING MISCELLANY

Meliphanite, one of the rarest minerals of the beryllium group, and formerly found only in the Kola Peninsula in Russia, and in Norway, has been located in Uzbekistan in the U.S.S.R. Main components of meliphanite are beryllium, calcium, magnesium, aluminium, silicon and sodium.

★

Shipment of 18 barrels, each containing 557 lbs. of 90 per cent molybdenite concentrates with a total value of $9,500, from the Canadian Keremeos Mines property to Sweden, is believed to be the first commercial shipment of this metal to be made from British Columbia.

★

Karachi has been suggested by the Pakistani Planning Commission as the site for the erection of a steel mill, a report on which has been submitted to the government by the British consultants, John Miles and Partners. (*M.J.*, Jan. 20, p.74). It is estimated that the projected plant will cost between Rs. 250,000,000 and Rs. 300,000,000, 60 per cent of the cost being in foreign exchange. A Japanese team has submitted a report on the construction of a steel mill, at a cost of Rs. 110,000,000, at Chittagong, with an initial annual capacity of 100,000 tons of steel.

★

From British Guiana, Barclays Bank D.C.O. reports that during December last, the total ore shipped by the Demarara Bauxite Co. during 1960 amounted to 1,898,833 l.tons, an increase of 539,601 l.tons on the 1959 total.

★

The Ontario Department of Mines reports that prospecting activity declined in the Province during 1960, the total number of claims recorded being only 18,474 compared with 26,031 in 1959.

★

A Japanese trade mission is in Argentina studying the possibility of acquiring quantities of beryllium and kaolin.

★

The Swedish-Polish Chamber of Commerce in Stockholm reports that a new Polish lead and zinc combine is to be set up at Miasteczko Slaskie in the Tarnowskie Gory district. Initial production is planned for 1954/65 and full production by 1967/8. Equipment for the new plant will come mainly from Poland, but some special equipment will be imported from West and East Germany and the United Kingdom.

★

The Humboldt works of the West German company, Klöckner-Humboldt-Deutz A.G., is to build two plants in Italy for producing zinc oxides from residues in electrolytic zinc production. The firm has recently installed similar units in Austria and elsewhere in Italy, and is building a 20,000-tonne electrolytic zinc plant in Spain, in which cadmium and germanium will be obtained as by-products.

★

A Russian survey of Queen Maud Land, Antarctica, is reported by *Tass* to have discovered large deposits of gold, diamonds, iron, mica and other minerals.

The Hungarian Government states that the bauxite mines at Bakony are undergoing stage-by-stage mechanization, beginning with ore loading.

★

Yugoslav mineral production for the first 11 months of 1960 was: blister copper, 2,980 tonnes (compared with 3,006 tonnes for the same period in 1959); electrolytic copper 2,886 tonnes (2,681); refined lead, 7,280 (6,823); aluminium, 2,061 tonnes (1,683); quicksilver 40 tonnes (38); ferro-alloys, 3,868 tonnes (3,245); coal, 1,882,000 tonnes (1,738,000); coke 90,000 tonnes (89,000); pig-iron 81,797 tonnes (70,643); raw steel, 120,901 tonnes (107,163); rolled steel products 80,319 tonnes (70,189).

★

North Vietnam is to export to Eastern Germany chrome, tin, tungsten and apatite over the five-year period 1961-65.

★

The United Arab Republic reports rich phosphate deposits near Lattakia and Palmyra resulting from mineral prospecting which has been proceeding in Syria for the past year.

★

Soviet reports announce that the zinc output of North Korea is increasing. Latest annual production figures for refinery zinc given are those for 1959, amounting to 20,000 tonnes. Zinc mines are in operation at Hatan-ni and other areas, and zinc refineries at Chinnampo, Hunguam and Wonsan.

★

Salzgitter, of Western Germany, which has signed a contract to advise the Corporacion Miniera de Bolivia (COMIBOL) on the reorganization of the Bolivian tin-mining industry (see *Mining Journal*, January 13, p. 47), has also been granted a contract for the drawing-up of a study of Bolivia's El Mutun iron ore deposits.

★

Rumania has granted a credit of 233,000,000 lei to North Vietnam to help increase Vietnamese production of apatite. The credit will be met by apatite deliveries, amounting to 630,000 tons a year in 1965 and 1,000,000 tons in 1970. Under the agreement recently signed, Rumania is to deliver equipment necessary to step up production at the Lao Tai Mine; provide a mineral enriching plant and technical help in setting it up; rolling stock and technical assistance in building a rail transport system from the mine to Haiphong Harbour; and training for North Vietnamese technicians.

★

Under the second Indian Five-Year Plan, three regional offices, northern, eastern and southern, have been established under the Department of Geological Survey of India for mapping, engineering geology and groundwater. The eastern region covers Andaman-Nicobar, Assam, Bihar, Manipur, Nefa, Orissa, Tripura and West Bengal. The northern region covers Delhi, Jammu and U.P. The southern region includes Andhra Pradesh, Bombay, Kerala, Madhya Pradesh, Madras, Mysore and Pondicherry.

★

Intensive search for fresh gold deposits in the Kolar region of Mysore during the last three years has met with little success, and it is feared that unless new seams are found in the vicinity, it may become necessary to close down the Kolar gold fields, India's only source of gold, within six or seven years.

★

The most northerly railway line in the world has recently been completed in the U.S.S.R. The line, of 100 miles within the Arctic Circle, links Murmansk with the nickel ore deposits at Pechenga.

★

Tanganyika now permits prospecting companies to mine for diamonds in 20 blocks of 15,000 sq. miles each. This policy repudiates the prospecting monopoly held throughout Tanganyika by Williamson Diamonds, but this company which has been prospecting intensively for the past two years, will be given first choice of four of the blocks, provided it is made by July 1. Companies are free to apply for more than one block, but must undertake to spend at least £30,000 on each block. Grants will be valid for 3½ years, but, when required, two-thirds of the area can be surrendered within 2½ years, and at any time during the 3½ years, the prospecting company can apply for an exclusive prospecting licence or mining lease. The government will only consider applications from established mining concerns. Individual prospectors are barred.

★

An experimental coal gasification plant has been formally dedicated at Inha Institute of Technology, Inchon, Korea. The plant is a gift from the German firm Lurgi.

★

Metal Manufactures and Cable Makers Aust. Pty., are building a non-ferrous metal fabricating and cable works on a 40-acre site at Melville, seven miles from Perth, Western Australia, at a cost of over £500,000. The factory is to produce copper wire and strand and annealed copper tubing, sufficient for all Western Australia's needs, from virgin metal and other raw materials to the finished products.

★

A deposit of tin, said to be comparable to that mined in the Catavi mines in Bolivia, has been discovered in Antofogasta, Chile, and Compania Explotadura de Minerales de Chile has requested U.S. firms to make a geological survey of the area. Meanwhile, six German technicians have arrived in Chile to carry out drillings, preliminary to developing a copper mine at Andacollo, in the Province of Coquimbo. The deposit will be jointly operated by the Mansfeld Co. of Germany, and the Chilean firm, Tamaya S.A. Empresa Nacional de Mineria, a semi-state agency, states that it will sell abroad 2,515 tons of lead ores and concentrates. The sale of lead ore to Germany, valued at $135,405 has already been authorized.

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MAP OF THE GOLD MINES OF THE KINROSS AREA

Copies of this map, prepared by *The Technical Map Service* of Johannesburg, are now available in London. They show (as at November 1959):-

- the exact position of each mine on the field.
- where on each property boreholes have been sunk, and what has been the core recovery on reef intersection.
- what shafts are being sunk.

Accompanying this map is a small outline map, bringing the borehole results up-to-date as at October 1960.

★While a mine is at the development stage, it is of vital importance to have a visual picture of its position in relation to the field as a whole. Otherwise the quarterly results published by the companies lose much of their significance.

★Results reported from adjacent mines often have a direct bearing on the one in which you are interested, which, however, can only become apparent if you have clearly in mind the position of the properties in relation to one another.

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Metals and Minerals

The Magnesium Industry

From preliminary data, the Bureau of Mines, U.S. Department of the Interior, estimates that world production of magnesium rose in 1960 to 114,730 s.tons from 105,000 tons in 1959 and 103,900 in 1958. Last year's gain of nearly 10,000 tons was due mainly to the higher U.S. output, which increased to 39,360 s.tons from 31,033 tons in 1959.

Consumption of magnesium in the U.S. rose last year to about 55,000 s.tons, an increase of 7 per cent over 1959, reports the Commerce Department, which forecasts a further increase for 1961. Particularly noteworthy is the fact that more than half the magnesium consumed in the U.S. now goes into non-structural uses, such as alloying, and into the production of other metals such as titanium and zirconium. Defence applications still account for nearly half the total consumption, but wider usage in rockets and missiles has not fully offset the loss resulting from lower levels of military aircraft production. According to a recent statement by Dow Metal Products Co., division of Dow Chemical Co., current production of the Talos missile uses magnesium extensively, both for primary and secondary components. Several hundred pounds of magnesium are being used in each missile constructed, approximating to about 10 per cent of the weight of the missile, including the war head and fuel. At flight speed, many of the primary components reach temperatures around or over 500 deg. F.

Civilian type uses are reported to be increasing. A new metallurgical application, in the desulphurization of steel, shows promise. More magnesium is being used in automotive parts, materials handling equipment, etc. Nevertheless, according to *American Metal Market*, the amount going into surface vehicles, including motor cars, still accounts for less than 2 per cent of total structural uses. Planes and missiles take about 20 per cent of the structural total.

A greatly expanded use of magnesium by the U.S. motor car industry is foreseen. In co-operation with this industry, extensive testing and evaluation of magnesium in a wide variety of motor car components has been carried out, which will result in magnesium components in some of the 1961 models. Dow anticipates an extension of this market, largely in diecast plants. It has been predicted by an official of a magnesium company that by 1965 usage of magnesium in the U.S. motor car industry will exceed 10 lb. per car.

A further report in *American Metal Market* states that Boeing Airplane, one of the first users of magnesium tooling plate, has become the first user to contract for volume delivery of the metal. An agreement has been concluded between Boeing and Dow Metal Products Co., under which the former will benefit in reduced costs as volume use of magnesium increases. The major significance of this contract, it is stated, is that Boeing can now expand its use of magnesium tooling plate with assurance of a guaranteed price, which should average 20 per cent less than in the previous year.

Though almost entirely dependent on imports for its present supply, Germany has become on of the highest *per capita* users of magnesium, consumption exceeding ½ lb. per person. This is due almost entirely to the extensive use of magnesium made in the German motor car industry, particularly in production of the Volkswagen. In 1959 consumption of alloyed magnesium in Western Germany exceeded 23,000 l.tons, of which Volkswagen—which has been averaging more than 41 lb. of magnesium castings per vehicle—probably accounted for around 15,000 tons. Plans to expand the use of magnesium into the transmission would further increase this company's requirements.

It is reported that the former Bitterfeld magnesium plant in East Germany is being rebuilt. Production is scheduled to start in 1964 and to reach about 7,000 tons in 1965. Eventually this capacity will be doubled.

AUSTRALIAN BEACH SANDS

Further information regarding the products of Western Titanium N.L., has been received from Fergusson, Wild and Co. Ltd., who were recently appointed European agents for this Australian company. Western Titanium's property is situated at Capel, 130 miles from Perth, Western Australia. Ilmenite production commenced in December, 1956. The plant has been operating for some months at the restricted production rate of 1,400 tons of ilmenite per week, but output could be stepped up to 2,000 tons. A typical sample analyses 55.48 per cent TiO_2. The specific gravity is 4.35.

Production of the secondary minerals was started in May, 1958. Weekly output currently comprises 12 tons of leucoxene, 10 tons of rutile, 100-120 tons of zircon, and 12 tons of monazite. Typical analyses give the following values: Leucoxene: Grade I 90.3 per cent TiO_2, Grade II 82.6 per cent TiO_2; rutile, 96.00 per cent TiO_2; zircon 65.80 ZrO_2; monazite 6.80 per cent ThO_2, 58.70 per cent rare earth oxides, and 27.00 per cent P_2O_5.

CANADA'S NEW MICA INDUSTRY

Georgian Mineral Industries Ltd. is producing ground and flake mica under the trade name "Geomica" at its plant in East Central British Columbia. The company is expanding to include the production of a finely ground mica to be marketed under the trade name "Geoflour".

All of Canada's flake mica requirements were hitherto imported from the South-eastern United States. The usual processes involve the grinding of sheet mica trimmings which is relatively costly. The deposit from which Geomica is prepared is found in an already flaky form and involves a very simple grinding and cleaning process. It is claimed that this simple process, combined with the high mica content of the ore, makes the operation extremely economical.

Although statistics on Canadian use of flake and ground mica are limited, the company estimates that Canada's market requirements are at least 5,000 tons per year. There are also numerous potential markets in which alternative products are presently being used due to the high cost of imported U.S. mica.

In the process employed by Georgian Mineral Industries, the relatively soft muscovite mica schist is first dried in a rotary kiln, and then pulverized in a high speed hammer mill. The crushed product consists entirely of less than $\frac{1}{16}$ in. material. It is then screened in gyratory sifters to six size ranges. Each size is passed separately over an air separation unit which removes the small amount of quartz and garnet by-product. The mica concentrate is stored in separate bins.

The final products of variable specifications are then prepared by mixing different sizes. The flake mica is shipped in 50 lb. paper bags for ease in handling.

A complete range of sized quartz sand and garnet are produced as a by-product directly from the operation. These are available to Canadian abrasive consumer for use as chicken grit and as sand blasting material.

U.S. FLUORSPAR OUTPUT RISES

Improved marketing conditions resulted in a rise in U.S. output of fluorspar last year according to the U.S. Bureau of Mines. Production totalled 237,000 s.tons (worth $10,600,000) compared with 185,000 s.tons ($8,700,000) the year before. While prices of metallurgical fluorspar from Mexico increased slightly during 1960, those of domestic fluorspar remained stable following the reduction of acid and ceramic grade prices in mid-1959.

Industrial consumption of fluorspar showed a significant increase last year compared with 1959. More fluorspar was used by steel plants, and because of a bigger demand for synthetic cryolite and aluminium fluoride by the aluminium industry more fluorspar was consumed by hydrofluoric acid producers.

Steel production accounted for the biggest increase in fluorspar consumption during the third quarter of last year, with a rise of 181 per cent over the corresponding quarter of 1959 when the steel plants were on strike. But compared with the second quarter of 1960 a relative lack of demand for steel resulted in 24 per cent less fluorspar being consumed by the steel industry.

Mine production of crude fluorspar totalled 150,200 s.tons from domestic sources in the third quarter of last year. Fluorspar mills processed 166,100 s.tons from which 71,300 s.tons of finished fluorospar were recovered compared with 53,610 s.tons in the second quarter. Consumption of fluorspar in the third quarter totalled 167,416 s.tons, a rise of 12,300 s.tons over the second quarter.

U.S. USES MORE VANADIUM

Consumption of vanadium in the U.S. last year was about eight per cent higher than in the year before. Consumption of vanadium last October was nine per cent less than in September.

Exports of ferrovanadium and other alloying materials containing over 6 per cent vanadium were slightly larger in 1960 compared with the previous year.

The Nuremberg, West German, metallurgical concern Gesellschaft für Elektrometallurgie mbH announces the development of a new process for the production of vanadium in greater quantities than has hitherto been possible and with a purity grade of 99.9 per cent. The pro-

cess is described as chemical and metallothermal and is based on the production of vanadium metal from vanadic acid at a high temperature and under pressure.

U.S. GRAPHITE PRODUCTION

In spite of a fall in the total output the value of domestic graphite production in the U.S. rose last year. This was because the industry mined only crystalline graphite and marketed none of the lower priced amorphous variety. The U.S. imports of graphite still mainly consisted of Mexican amorphous, Madagascan flake and Ceylon lump but substantial imports were also received from Hong Kong, Norway, West Germany, British East Africa, Turkey and France.

RUSSIAN VERMICULITE FINDS

Several deposits of vermiculite have been discovered on the Kola Peninsula, U.S.S.R. The Kovdora deposit, the only one explored in detail, is estimated to contain 60,000,000 tonnes of vermiculite and alleged to be comparable in size to the largest vermiculite deposits in the U.S. and South Africa.

The vermiculite content of the ore ranges from 1 to 45 per cent with an average of 14 per cent, the fine material from 0.5 to 1 mm. averages about 4.7 per cent vermiculite. The ore contains two important types of mica : the silvery black or dark green biotite - phlogopite and golden brown vermiculite. The orebody is apparently easy to mine as it has virtually no overburden and few drainage problems. It is understood that a concentration plant is to be built at Kovdora.

AGREEMENT BETWEEN VALCO AND GHANA

The draft agreement between VALCO (the Volta Aluminium Co.) and the Ghana Government, covering the building and operation of a £100,000,000 smelter, was published yesterday. It gives the company freedom from all forms of duty, as well as from taxes on dividends, for ten years. Tax rates are guaranteed to remain for the company at present levels for thirty years. Under the agreement VALCO undertakes to build a smelter at Tema reaching a capacity of 200,000 kW. eight years after the award of the Volta dam contract, and a capacity of 300,000 kW. not later than eight years thereafter. The agreement also provides for the mining and processing of Ghana bauxite. The shareholders in VALCO are Kaiser Aluminum, Olin Mathieson, Reynolds and ALCOA.

INDUSTRIAL DIAMONDS FOR SHANNON

Boart and Hard Metal Products S.A. (a subsidiary of the Anglo American Corporation) has recently established three new companies at Shannon Airport. They are Shannon Diamond and Carbide Processing Company, Shannon Purchasing and Trading Company and Shannon Carbide Sales which will process industrial diamonds and manufacture diamond tungsten carbide drilling materials.

Among the reasons for the choice of Shannon for these companies were the facilities of the Shannon Industrial Estate, convenient air transport and exemption from taxation of profits on exports until 1983. About 70 people are expected to be employed by the end of the year.

WOLFRAM ORE PRICE FALLS

The wolfram ore shipment price range per l.ton unit c.i.f. Europe is now 128s. 6d. to 133s. 6d., a fall of 1s. 6d. from the previous levels. Dealers report a quiet market.

U.K. ANTIMONY CONSUMPTION FALLS SHARPLY

British consumption of antimony metal and compounds fell sharply last December to 409 l.tons from 497 tons in November, according to the British Bureau of Non-ferrous Metal Statistics. Total consumption for the whole of 1960, however, amounted to 5,719 l.tons compared with only 4,923 tons the year before.

Offtake of antimony for batteries in December came back to 119 l.tons against 194 tons while declines in antimonial lead consumption by other users fell to 54 tons (66). Consumption of oxides for uses other than white pigments fell to 80 tons (85) and of bearings 21 tons (25).

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(From Our London Metal Exchange Correspondent)

Although there have been no fresh developments of a bullish nature within the metal industry itself during the week, the recent upward movement has been fully maintained. It is, however, uncertain as to how much of this can be attributed to events more of a political nature than anything else, and how much to the belief that there are already signs of some improvement in world trade generally.

COPPER AND THE POLITICAL FACTOR

The serious turn of events in Central Africa during the week has, without doubt, been the main feature as far as the copper market is concerned. It is difficult to foresee that, under present circumstances, current values can be other than fully maintained or, indeed, improved upon, so long as the uncertainty regarding the future of the territory persists. In consideration of these factors buyers have shown appreciably more interest, whilst there has also been some bear covering in evidence in London. A contributory feature to this latter consideration has been a further decline of 225 tons to 14,750 tons in stocks of copper in London Metal Exchange official warehouses, which has resulted in the near elimination of the contango.

In the U.S. the Copper Institute's statistics for January were considered much better than had been expected. Details of these are as follows :

	U.S.		World	
	Jan., 1961	Dec., 1960	Jan., 1961	Dec., 1960
Refined copper production ...	144,697	152,211	176,851	166,529
Deliveries to fabricators ...	99,794	91,163	214,645	225,811
End of month stocks	144,132	139,272	292,757	288,510

General uncertainties regarding the future have also had their impact on this market, and buyers have been less reserved than recently with both customs smelters and producers reporting active demand at the 29 c. level. Dealers also report an improved undertone in the market, although with their price at around the same level as customs smelters' and producers', activity in their sphere has not been quite so brisk.

The U.S. scrap price has been advanced ¼ c. to 23¼ c. In the middle of the week a report from Chile indicated that the stevedores labour force at Chilean ports had threatened to stop operations for an indefinite period.

TIN DEMAND STRONGER

Tin has been an active market during the week, with a noteable improvement in demand on the part of both U.S. and European consumers. As such, values in both London and Singapore have advanced steady and on Thursday the Eastern price was equivalent to £817⅛ per ton c.i.f. Europe. The market has been awaiting just such an upswing in consumer buying and it remains to be seen whether the level of industrial activity and demand, mainly perhaps from the tinplaters, is held at the improved level to maintain current values.

U.K. official warehouse stocks last week rose 55 tons to 10,153 tons.

LEAD-ZINC STUDY GROUP HOPES

Lead and zinc have joined in the general upward movement with zinc, perhaps, making the better showing of the two. To some extent, of course, this has reflected the rise in copper and tin, for it must be realized that in 1959, for example, the Congo produced about 54,000 tons of zinc whilst Northern Rhodesia in 1960 produced about 30,000 tons of zinc and about 14,500 tons of lead. Apart from this, expectations are still high that some effective results will come from the Lead and Zinc Study Group's meeting in Mexico beginning March 20.

In both cases, consumer demand has been satisfactory, whilst supplies of Spanish lead have not been so much in evidence, and offerings of zinc from the U.S. have not been so forthcoming. As such, the contango in lead has narrowed and the backwardation in zinc has broadened. U.K. warehouse stocks of lead showed no change on balance last week, while duty free stocks of zinc increased 96 tons to 3,076 tons, and bonded stocks fell 25 tons to 500 tons. In the O.E.E.C. countries total refined pig lead production amounted to 58,702 tons in January compared with 69,081 tons in December and stocks were 54,212 tons and 55,664 tons at the end of each respective month. Zinc production also showed a small decline at 72,162 tons in January compared with 74,889 tons in December, while stocks at 48,856 tons showed little change from 48,813 tons at the end of December.

OFFICIAL TURNOVERS

Official turnovers in l.tons for the week ending February 18, with the previous week's figures in parentheses, are :

Copper	20,725	(18,575)
Tin	630	(1,510)
Lead	10,750	(5,400)
Zinc	11,700	(10,350)

Closing prices are as follows :

	February 16 *Buyers*	*Sellers*	February 23 *Buyers*	*Sellers*
COPPER				
Cash	£224⅛	£224½	£227½	£227¾
Three months ..	£225	£225½	£227½	£227¾
Settlement ..	£224½		£227¾	
LEAD				
Current ½ month	£66⅛	£66¼	£64⅛	£64¼
Three months ..	£67⅜	£67½	£65¼	£65⅜
TIN				
Cash	£793	£793½	£801	£801½
Three months ..	£796	£796½	803½	£804½
Settlement ..	£793½		£801½	
ZINC				
Current ½ month	£84⅛	£84½	£84	£84⅛
Three months ..	£83½	£83⅝	£83	£83¼

LONDON METAL AND ORE PRICES, FEB. 23, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 8d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram.
Magnesium, 2s. 2½d./2s. 3d. lb
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/£28½
Quicksilver, £69 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79⅛d. f. oz. spot and 80⅛d. f'd.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	25s. 0d./27s. 6d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	255s./265s. per l. ton unit BeO
Bismuth	65% 8s. 6d. lb. c.i.f.
	18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
,, Hard Lumpy 45% .. .. (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
,, Refractory 40%	£11 0s. 0d. per ton c.i.f.
,, Smalls 44% .. .. .. (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% .. .. .. (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) $Nb_2O_5 : Ta_2O_5$	165s./170s. 0d. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£26 0s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	130s. 0d./135s. 0d. per unit c.i.f
Vanadium—	
Fused oxide 95% V_2O_5	7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2	£16/£16 10s. ton c.i.f

Mining Finance

Chartered's Investment Policy

The results of The British South Africa Company, or Chartered as it is called, were commented on here last week. The full report shows that, as then forecast, the allocation to general reserve is being stepped up by £1,000,000 to £3,000,000. This reserve also gets the benefit of a tax write-back of £1,800,000 so that it now stands at £20,300,000. Investments at £44,159,274 show an increase in book cost of £4,476,583, a reflection of the company's continuing investment expansion policy, but the market value is down by just over £1,000,000 compared with September 30, 1959, a result of the depression in African shares generally and also of the Board's decision to value unquoted loans, such as that to the Federal Government for Kariba, at a price which gives a yield comparable to that on quoted Federal loans of the same maturity. (Page 228)

The President of Chartered, Lord Robins, defends the policy of expanding investments outside the Rhodesias, pointing out that the group has other sources of revenue beyond the mineral rights from Northern Rhodesia so "surely it cannot be denied the right to invest that revenue, or in fact any part of its revenue, in other parts of the Commonwealth in the best interests of its members".

The President reveals that, besides the investment in Consolidated Zinc's Australasian aluminium project already commented on in these columns, Chartered is negotiating, together with a British group which has many years' experience of estate development in British Columbia, for a substantial investment in land near Vancouver. At September 30 last, taking quoted investments at market value and unquoted at book value, Chartered still had its biggest stake in Rhodesian minining companies at £14,596,000, but close behind comes other mining companies at £13,915,000, then miscellaneous Rhodesian investments at £9,550,000 and other investments £2,894,000. This is apart, of course, from the £11,598,000 figure for the investments held by the Rhodesia Railways Trust subsidiary, primarily in the U.K. and North America.

Even so, Chartered is still substantially dependent on Northern Rhodesia for its fortunes hence the yield of over 11 per cent on the 15s. units now down to 66s. There is also the prospect of lower earnings this year in view of the setback in the metal price and the 10 per cent cut in Northern Rhodesian production, although the London cash copper price at around £226 a ton is now slightly above the £222 on which Chartered's 1959-60 mineral royalties were based. Copper has recovered to this level, however, largely owing to fears that the stormy central African political situation might touch off events that could disturb the even tenor of production on the Copperbelt. It is worth noting that Chartered's 7s. 6d. dividend is handsomely covered, to the extent of just on twice, by last year's net earnings.

London Market Highlights

The week in African mining share markets opened dismally with sentiment overshadowed by the worrying Rhodesian political situation and the latest outburst of violence in the trouble-torn Congo. Once again, selling was relatively slight, but there were no buyers to absorb the stock offered and share prices drifted even lower.

The impasse reached in the Northern Rhodesian constitutional meetings was a particularly adverse factor in the copper group, but after a further tumble on Monday share prices were showing signs of resistance on Tuesday, and helped by the Chartered report and president's statement some confidence began to creep back into the market on Wednesday morning. However, better feeling was short-lived when the first reports were received on that day of the Rhodesian ban on capital movements.

Bancroft, which had improved a few pence to 13s. 10½d. closed with a net loss on the day of 7½d. at 13s. 6d. Nchanga were finally 3s. down on the three days at 43s. 6d. and Chartered came back from the previous Friday's 71s. 9d. to 64s. 6d. ex-dividend.

The rather better trend in Kaffirs was also reversed. The Rhodesian exchange control moves were seen as a further indication of the mounting tension in the neighbouring Federation and the market also feared that they could mean a stop to the, admittedly small, supply of investment money from Rhodesia to the South African gold share market.

Gold share prices thus resumed their down drift, Free State Geduld being lowered to their lowest since 1958 of 105s. Western Holdings were showing a loss on the week of 3s. 9d. at 137s. 6d. and St. Helena, 2s. down at 65s. 7½d., were additionally unsettled by anticipations of a lower dividend next month, even though the dividend would be an interim and thus not necessarily indicative of a lower total for the year.

Finance issues followed the same pattern. Erstwhile favourites such as Gold Fields (55s.) and Union Corporation (55s.) suffered most, the former tumbling to a new low for 1960-61. In the diamond group, De Beers receded to 148s. 9d.

While all this was going on, the tin share market steadily edged ahead. The already persistent demand from Singapore was enhanced by more enquiry from London investors who were impressed by news that both U.K. and U.S. tinplaters were experiencing a recovery in demand.

London Tin hardened to 14s. 6d. on the excellent dividend and profits forecast and there was a general rise in share prices of the producing mines. Among them, Tronoh climbed from 41s. 9d. to 43s. 6d., Sungei Besi from 26s. 3d. to 28s. 6d. and Ayer Hitam from 25s. to 27s. Useful gains were also seen in Siamese (15s. 9d.), Tanjong (25s. 6d.) and Idris (12s. 3d.). There was a reaction of 1s. to 26s. in Ipoh, however, following the directors' rejection of the unsatisfactory cash bid for part of the company's capital.

FRISCO TRIES TO CUT TAX BILL

The big news in the San Francisco Mines of Mexico report for the year to last September is that this Union Corporation group lead-zinc producer is proposing to "Mexicanize" itself. In brief, this rather ugly word means that the Mexican mining operations will be transferred to a Mexican incorporated company, one that is already in existence, and an arrangement will be sought whereby Mexicans can acquire a 51 per cent holding in this company on terms, that, it is hoped, will be mutually satisfactory. The chairman, Mr. R. H. MacWilliam, says that he sincerely hopes that it will be possible to formulate a suitable scheme. If so, proposals for implementing it will be submitted to stockholders. (Page 230)

The next question, of course, is why the company is doing this. Well, for one thing a new mining law has been adopted in Mexico which is expected to prohibit the acquisition of new mining claims by foreign controlled companies, although respecting existing claims. Secondly, a simultaneous amendment to the tax laws should mean that a Mexican controlled company will be entitled to a rebate of 50 per cent of the Federal Government's share of the production and export taxes. This could mean a net saving to 'Friscos of about 37½ per cent of these taxes, although, it is pointed out, the resultant increase in retained profit would still be subject to Mexican income taxes.

As readers of these columns will well know, the tax burden borne by San Francisco for many years past has been almost unbelievable in its severity. For instance, last year's net profit of £407,125 was arrived at after providing Mexican taxes of no less than £2,387,856 made up of production, export and mercantile taxes of £2,032,231 and income taxes of £355,625. The great question for stockholders is naturally whether or not the new arrangement, leaving them with only a 49 per cent stake in their company's mining operations, will be to their benefit. Mr. MacWilliam will no doubt be asked to throw a little more light on the possible answer to this at the meeting in London on March 21. But as "Mexicanization" of the mining industry is now a major aim of Mexican Government policy 'Frisco is no doubt having to bow to the inevitable whether it really likes it or not.

All this apart, the company is not currently doing very well owing to the setback in lead and zinc prices. It has, the chairman says, been barely breaking even and has also to face the prospect of demands for increased wages in the renegotiation of labour contracts in the middle of 1961. However, from 1962 onwards it is hoped to reap the benefit of the company's new fluorspar plant. In addition, Mr. MacWilliam points out that the mines are in first-class shape and should be able to reap the full benefits of any better metal prices.

The 10s. units stand at 15s. 6d. ex-dividend. Hang on and hope for the best seems the best advice to stockholders.

THE NEW TREND IN MINING ACCOUNTS

Incidentally, San Francisco Mines is this year adding its support to the growing number of mining companies which no longer present their profit and loss statements in the traditional form of balancing debit and credit columns. Such a presentation is no more than the end product of double entry book-keeping and it is encouraging that this is now gradually giving way in mining company accounts as elsewhere to a logical narrative form running from gross revenue through the successive stages of mining costs, administrative overheads and tax to net profit and the analysis of its appropriation.

There are still comparatively few mining companies which present their profit and loss accounts in this form and the particular style adopted by 'Frisco is in some ways the best we have seen, except that, for no obvious reason, they have in presenting their gross revenue figure, lost the breakdown of this total metal by metal, which has been available in past years.

Equally interesting is the much simplified treatment of the company's balance sheet, which has been achieved by transferring to an annexe the detailed build-up of the main balance sheet headings and has also limited the items on the debit side to those which are the sole property of the shareholders, all current liabilities being shown separately as an offset against current assets. If this style of presentation is to be extended to other companies in the Union Corporation group it will be interesting to see how the items of loan capital will be dealt with.

NO SCRIP ISSUE FROM C.M.S

There will probably be a certain amount of disappointment with the 1960 results for Consolidated Mines Selection, the London based mining investment company in the Anglo American Corporation group. It will arise not because the profits are modestly down but because there is no mention in the preliminary statement of the capitalization issue that shareholders have become used to and therefore tend to regard as an annual event. There has been an issue of this kind in each of the three previous years. It was 5 per cent for 1957 and 10 per cent for 1958 and 1959.

In the past year, of course, the company will have had to pass through the fire of the Kaffir market's political malaise, but its gross profit before tax is down by only £15,190 at £384,896. This is the net result of a fresh rise in dividend income and of an understandably sharp falling away in receipts from share realizations and underwriting commissions. Investment revenue rose from £352,627 to £408,065, but the second item produced only £14,835 compared with £81,519 in 1959.

Moreover, on this occasion, also understandably, £226,527 has had to be withdrawn from general reserve in order to cover net depreciation in investments during the year. Against this, £126,527 has been added to this reserve from the 1960 profits so that it still stands at £425,000 or only £100,000 less than a year previously.

C.M.S. has suffered a lower tax charge so that its net surplus of £319,623 is in fact nearly £20,000 higher than in 1959 and as forecast by the chairman, the late Mr. Comar Wilson, a year ago, the maintained dividend of 2s. 6d. on the capital as increased by the 10 per cent free share issue is very comfortably covered absorbing only £183,845. Carry-forward is raised by £9,251 to £55,902. The final dividend now declared is 1s. 6d. per 10s. share. The full report is due on or about March 6.

It looks as though C.M.S. is hardly likely to have permanently ceased its capitalization issues despite the present omission which comes, after all, at the end of a trying year. At the close of 1959 the company had a capital reserve of £528,525. This will still stand at £419,378 after allowing for the 1960 share issue which required the capitalization of £109,147. The shares are 27s. 3d. x.d. cum dividend to yield 9 per cent, a good return for a concern of this calibre. C.M.S. shares often tend to lag behind others in the Anglo American group owing to their relative unpopularity in the Johannesburg market caused by the deduction of U.K. tax from the dividend payments.

LAKE GEORGE'S BREAK-UP VALUE

The report of Lake George Mining Corporation for the year to June 30 last throws some fresh light on the Board's statement at the beginning of February that the price of 4s. for the 5s. shares did not fully represent their value. Since then the price had been raised in the market to 5s. 9d. which is cum the proposed 2s. per share capital repayment. The June 30 consolidated balance sheet shows that net liquid assets at that date amounted to £676,479 compared with the present capital of £555,000. They thus equalled just over 6s. a share. The greater part of these assets are represented by cash and short loans and by concentrates on hand and in transit, but also included are stores on hand taken at cost of £125,287.

Ore reserves remaining to be extracted at this Australian lead-zinc mine, now nearing the end of its life, amounted to 526,500 tons last June equal to some 2½ years' supply for the mill at the 1959-60 hoisting rate. After these have been exhausted there will be the final clearing up of the property and disposal of the machinery and other assets. The returns of capital to shareholders and eventual liquidation distributions are thus likely to be spread over quite a long time. But it certainly seems as though there should eventually be total distributions comfortably above the present market price. The chairman, the Hon. R. M. P. Preston, may be able to give further official guidance on this point at the meeting on March 14.

PECULIAR BID FOR IPOH TIN

A somewhat extraordinary bid is being made to gain control of Ipoh Tin Dredging. It is extraordinary in the first place because the offer of 27s. per 8s. share in cash emanating from Raybar Holdings, formerly the London Cemetery company, is only for 80,000 shares which is no more than 40 per cent of Ipoh's issued capital of £80,000 in 200,000 shares. Such a partial bid cuts across all the canons of bid procedure that is being slowly but surely built up in the City of London.

The second unsatisfactory feature of the bid is whether it is, in fact, adequate in relation to Ipoh's strong asset position and operative tin producing property in Malaya. Thirdly according to the Ipoh Board, there is no indication as to what Raybar proposes to do with the company if it gained control which, as it claims to hold 26,000 Ipoh already, it would apparently just about do if its bid were successful.

The Ipoh Board, whose chairman is Mr. R. Ellerton Binns, says that they cannot recommend the offer and must therefore "leave it to shareholders to make their own decision as to the acceptance or rejection thereof". The shares have been marked up to 26s. Their lowest over the past fourteen months was 18s.

A bid to be resisted is the only verdict on the present terms. In 1956 Camp Bird bid unsuccessfully for Ipoh, a move that jolted the Board into returning 8s. a share to holders.

BARROW HEPBURN'S RESULTS

In their report and accounts for 1960, Barrow Hepburn and Gale report a sharply reduced net trading profit before tax at £39,091 (£228,177). However, after providing for tax and taking into account £32,229 as the excess over book value on the sale of certain fixed assets and after transferring £20,000 from stock valuation reserve, the net balance for appropriation amounted to £88,666 (£156,357) plus a carry forward from 1959 of £312,689. In the circumstances it is not surprising that total dividend payments for the year are down to 15 per cent against 20 per cent in 1959.

At the same time the chairman, in his statement to shareholders (see p. 232), expresses the view that the company's outlook for the current year offers "a better promise on a firmer basis than any period that we have experienced in recent years". This confidence is clearly underlined by the relatively small cut in dividend distribution for 1960 and in this connection it is also interesting to note the chairman's observation that his board regards the stock valuation reserve as a dividend equalization account. The leather trade is liable to severe price fluctuations and the reduced profit for 1960 is attributable mainly to the writing down of stocks, both of leather and tanning materials.

Jantar's Improved Production.—At this week's annual meeting of Jantar Nigeria, the Chairman reported that the company's tin and columbite production in the December quarter was 61 per cent up on the figure for the corresponding quarter for 1959, despite a 20 per cent power cut due to water shortage. At the same time costs have been averaging at about £30 per ton less. The Chairman reminded shareholders that owing to seasonal factors production in the December quarter was usually high. Jantar's report and accounts were examined in these columns on February 3 and the chairman's statement is reported on page 231.

Central Mining Preference Capital.—We referred here in our issue of February 3 to the proposals for the reorganization of the share capital of Central Mining and Investment so as to eliminate the preference capital and voting rights through an exchange of preference for ordinary shares. These proposals have now been approved by shareholders and subject to confirmation by the Court will become effective on March 30.

THE BRITISH SOUTH AFRICA COMPANY

NET PROFIT HIGHEST IN GROUP'S HISTORY

DIVERSIFICATION WITHIN THE COMMONWEALTH: CRITICISM ANSWERED

RHODESIA CONTINUES TO BE PRIMARY FIELD FOR INVESTMENT

THE MONCKTON REPORT AND AFRICA'S PROBLEMS

"I have every belief in the future of the Federation"—Lord Robins

The 63rd annual meeting of The British South Africa Company will be held on March 16 at The Chartered Insurance Institute, 20 Aldermanbury, London, E.C.2.

The following is an extract from the statement by **Colonel The Lord Robbins, K.B.E., D.S.O.** (the President), circulated with the Report and Accounts for the year ended September 30, 1960:—

Once again I am adopting the practice instituted last year of issuing with the Annual Report and Accounts of the Company and its subsidiaries the Statement which in all previous years, had been made at the Annual Meeting.

In the course of this statement I shall use the term "Group", which must be taken to cover the parent company itself or any of its subsidiary companies with whose operations I may be dealing.

There has been no change in the capital structure of the Company, nor in the composition of the Board, since we met in March, 1960. But, owing to the resignation from the Company's service of Mr. R. H. C. Boys, the sole executive and administrative responsibility in Africa has been assumed by Mr. E. S. Newson, O.B.E., as General Mangager; and I take this opportunity of congratulating him on the honour conferred upon him in last year's Birthday Honours.

Accounts

Consolidated Profit and Loss Account: You will see from page 9 of the Report and Accounts that this year we are presenting on one page a simplified form of Consolidated Profit and Loss Account. It throws into sharper relief the principal items which comprise our consolidated revenues and the charges against them. We hope that you will approve this innovation.

Our mineral revenue and investment income both increased, with the result that the consolidated profit before taxation rose from £11,436,350 to £13,548,928, an improvement of £2,112,578. Taxation on those profits only increased by £545,795 to £5,400,683, leaving the consolidated net profit at £8,148,245. This figure is the highest in the company's history by over £1 million.

Gross income from investments passed the £3 million mark for the first time. The increase of £783,974 over the previous year's figure arose mainly from larger dividends paid by the Northern Rhodesia copper mining companies and from the first dividend received by the Group on its holding in Union Corporation. You will see amongst the credits on page 9 that the group made a profit on realization of investments of £369,709. Lower down amongst the charges you will notice that provision has been made for depreciation of investments amounting to £998,545. The latter provision covers the writing down to market values at September 30, 1960, of certain quoted securities, whose book value exceeded market value on that date.

Out of the consolidated net profit of £8,148,245 the sum of £939,894 has been retained by subsidiary companies. After taking account of these retentions and of £1,101,030 paid last October as an interim dividend, the Directors recommend:—

Final dividend of 5s. 6d. per unit or share less income tax	£3,027,833
Transfer to General Reserve	£3,000,000

The balance on Profit and Loss Account to be carried forward will be increased by £79,488 to a total of £2,474,781.

The interim dividend of 2s. 0d. which was paid on October 20, 1960, together with the proposed final dividend of 5s. 6d. to be paid on March 25, 1961, will make a total of 7s. 6d. per unit or share, a new record.

Consolidated Balance Sheet

The capital and reserves of the Group stand at £49,610,042, an increase of £4,019,382 over the previous year. You will see that the General Reserve has been increased to £20,300,000. This results from an appropriation from Profit and Loss Account of £3 million and a transfer of £1.8 million from the reserve for contingencies. The latter reserve was created in 1958 when The British South Africa Company first obtained provisional status as an overseas trade corporation under the Finance Act 1957. Had the company failed to receive confirmation of that status the amount reserved would have been required for payment of additional taxation. That contingency has passed and thus this sum of £1.8 million became free and has been added to the General Reserve.

The investments at £44,159,274 show an increase in book cost of £4,476,583. The market value of quoted investments together with Directors' valuation of unquoted investments has nevertheless fallen by £1,097,547. This has been due partly to the fall in market value of all African investments but is also due to the fact that, in making a valuation of unquoted investments at September 30, 1960, your Directors have thought it prudent to value unquoted loans, such as the Kariba loan to the Federal Government, at a price which gives a yield comparable to that on quoted Federal loans of the same maturity.

Net current assets at £1,415,653 show a decrease compared with the previous year of £977,834, and forward commitments at the date of the Balance Sheet amounted to £1,930,000 as against £2,360,000 a year earlier.

Investments

The investments position of the Group has been set out and analysed in considerable detail in paragraph IV of the Directors' Report, and I shall be able to bring those figures up to date when I address you at the Annual Meeting on March 16. But I wish particularly to report to you on certain important investment projects that have been undertaken since the end of the financial year.

Land Investment in Canada

In my speech at the Annual Meeting last year I reported on certain investments made by the Group in Canada and indicated that further long-term projects in that Dominion would not be overlooked.

We had felt for some time that Western Canada would provide us with a suitable field for long-term investment in real estate, and with this object in view we are negotiating, together with a British group which has many years' experience of estate development in British Columbia, for a substantial investment in land near Vancouver.

The Consolidated Zinc Corporation Limited

The British South Africa Company Holdings Limited, in conjunction with other companies with which we have close connections, has subscribed for £10 million of 5½% Unsecured Loan Stock 1966/71 in the Consolidated Zinc Corporation, such subscription carrying the option to acquire ordinary shares in the Corporation at an agreed price. The result of this subscription is that £5½ million of the Loan Stock will be held by our subsidiaries and will be paid up over a period of 3½ years and the remainder will be provided by our friends. This money will help to finance the Commonwealth Aluminium Corporation Pty. Limited, in which the Consolidated Zinc Corporation is associated with Kaiser Aluminum, and which is establishing new aluminium enterprises in Australia and New Zealand. Our colleague, Mr. P. V. Emrys-Evans, has accepted an invitation to join the Board of Consolidated Zinc Corporation.

I have heard from some quarters criticism that the Charter Group has diverted to investment in Australia, New Zealand and Canada monies that might have been invested in the Federation. I feel bound to meet that criticism. This investment of £5½ million, is small in relation to the millions that the Group has already invested in Rhodesia. Furthermore, the fact seems to have been overlooked that the Group has other sources of revenue than the mineral royalties from Northern Rhodesia. Surely it cannot be denied the right to invest that revenue, or in fact any part of its revenue, in other parts of the Commonwealth, in the best interests of its members. Indeed, the revenues from such an investment may very well provide funds for further investment in the Federation.

Rand Selection Corporation Limited

I wish to make it clear to the stockholders in The British South Africa Company that the securities (of a total value of approximately £13½ million on November 11, 1960), which the Boards of certain of its subsidiaries have agreed to transfer to De Beers Investment Trust Limited and through the latter to the expanded Rand Selection Corporation,

represent the greater part of the Group's existing holdings in companies operating primarily in the Union of South Africa. This transaction implies no change in the Group's policy regarding investments in the Union of South Africa. The Group's substantial holding in Union Corporation Limited is not included in this operation, nor will its investments in the Federation of Rhodesia and Nyasaland or elsewhere in the Commonwealth be in any way affected. Indeed, it will be a participant in, and well represented on the Board of, a major investment medium capable of playing an important part in the financing of new enterprises. It will have as its partners concerns with which it has been closely associated for a long period; and Rand Selection Corporation will in future enjoy a renewed and extended contractual participation in new business undertaken by Anglo American Corporation, a right of great value where the employment of its resources is concerned.

Having referred at some length to these new investments, I must emphasize that it is the Board's policy that the primary field for investment by the Group will continue to be the Federation of Rhodesia and Nyasaland. Apart from the continuous capital and maintenance requirements of the Company's agricultural and forestry enterprises (including a large capital sum for the heightening of the Mazoe Dam and the institution of an irrigation system for a three thousand-acre extension of its citrus plantations), the Group has purchased further freehold land in and around Salisbury; it has made available £200,000 in loan funds for agricultural settlement of ex-service personnel and young Rhodesian farmers, and £250,000 for the building of the Central African Archives.

It has also undertaken, together with an associated Company, to contribute £250,000 of loan money to the Southern Rhodesia Government's African Housing Scheme, designed to provide more and better housing for Africans employed by associated companies in the main urban centres of that Territory.

I think I may also mention under "Investments" the substantial contributions which the Group has made to the multi-racial University College of Rhodesia and Nyasaland, the Bernard Mizeki College for Africans, the Cathedral at Lusaka, the Barotse Development Fund and the Oppenheimer College of Social Service in Northern Rhodesia—to name a few—as these are investments in the progress and stability of the Federation.

Mining and Prospecting

In my statement last year, I recorded that Copper production had been a record at just over 475,000 tons. That figure has been left far behind by the production during the year under review of just over 560,000 tons. This large increase has been due to two factors. This was the first year for many years without loss of production either from strikes or because production had been restricted. Secondly the Bancroft mine enjoyed a full year's production and the two Nchanga open pits operated at planned capacity.

Mining revenue, after providing for the payment to the Northern Rhodesian Government of 20% of the net revenue, amounted to £11,835,000. This was the second largest amount received in any year to date, it having only been exceeded by the £12,262,000 received in the financial year ended September, 1956, during which the price of copper had averaged £351 per ton.

Members will remember that in October, 1960, an announcement was made by the two Copper Mining Groups to the effect that, in view of world production being in excess of consumption, they were restricting either production or sales. We must expect during the current year a reduction in the quantity of copper placed on the market and therefore somewhat smaller royalties due to this and to a lower average price for copper.

Prospects for the future in the longer term are nevertheless favourable. The capacity of the industry is high and still increasing. Labour relations are soundly based since the successful conclusion of the talks on African advancement. The agreement negotiated with the European Mineworkers' Union has eliminated any colour bar, the criterion being merit and responsibility. This was a notable advance and one for which the critics of the Federation have failed to give credit to Rhodesians.

The principal prospecting companies continued searching for new mineral reserves on the same scale as last year. Over £1 million was spent altogether in Northern Rhodesia. No new discoveries were made which deserve special mention. But this patient prospecting, using the most modern techniques, adds each year to our knowledge and is fundamental to the long term development of the natural resources of Northern Rhodesia.

Kariba

This magnificent hydro - electric scheme, towards the cost of which the Group contributed £4 million in loan funds, was formally inaugurated on May 17 last by Her Majesty Queen Elizabeth the Queen Mother. The provision of power from this source will not only enable full activity on the Copperbelt and elsewhere in Northern Rhodesia to continue without fear of interruption from shortage, but will also make possible the supply of power to industrial concerns in Southern Rhodesia and encourage expansion in such enterprises as Rhodesian Alloys and The Rhodesian Iron and Steel Company in which the Group is substantially interested.

Monckton Commission

When I last addressed you, the Monckton Commission was just about to begin its labours and great hopes were expressed that this body of prominent and experienced people would produce a report that would assist the Constitutional Review Conference to be held later in the year.

As you all know, the Commission produced its Report last autumn. The terms of reference of the Commission, announced on July 21, 1959, and agreed by all the Governments concerned, were: "To advise the five Governments in preparation for the 1960 Review, on the constitutional programme and framework best suited to the achievement of the objects contained in the Constitution of 1953, including the Preamble." The Constitution of 1953 was never expected to be in its details a hard-and-fast code of Government, but equally, I must point out, there was no provision in it for the dissolution of the Federation; nor was there any implication in the Commission's terms of reference that secession of any of its members should be considered; yet "secession" is given a complete chapter in the Report, which has occasioned surprise and some dismay among those concerned in the Federation's future.

It was expected that the advice tendered by Lord Monckton's Commission would have been along the lines indicated by the Prime Minister at Scarborough on October 15: "The purpose of the Commission was to help us not to destroy but to confirm and develop the Federal association between the three territories of Central Africa". Yet the Commission after thirty pages of cogent arguments in favour of the Federation and recital of its achievements, puts forward recommendations that seem designed to demolish that case. To quote the words used by Sir Roy Welensky in the Federal Assembly on October 25, 1960: "The Commission has given the benediction with one hand and the death stab with the other".

It is to be noted that it was not, in the strictest sense of the term, an agreed Report. Though twenty-three of the twenty-five members signed it, only eight of them signed unconditionally; fifteen signed with, between them, fifty-five reservations on points of fundamental importance; two would have nothing to do with a continuation of Federation and signed a minority report.

There must be many who will feel that the recommendations of the Monckton Report have not been helpful to a solution of the problems with which it was set up to deal. It must have had some influence on the Constitutional Review Conference, held in December, and in my opinion it must have made more difficult a satisfactory outcome of that Conference. There is every hope, however, that, when the Conference resumes, a revision of the Constitution will be devised that will preserve all that has been gained in Central Africa over the past seventy odd years and in its flexibility will give ample scope for the development of a multi-racial state based on a true conception of partnership.

There is, however, one point in the Report to which I should particularly like to draw your attention and which will, I hope, play an ever larger part in all discussions on the future of the Federation. The Commission emphasize that the Federation could not long survive if it were based merely on force. No one surely will dispute that. But they equally emphasize the essential importance of maintaining law and order; and here, at any rate, they are clearly right.

The development of undeveloped territories, a policy which is both popular and desirable, cannot be successful unless conditions are created which are stable and inspire confidence; otherwise projects which might appear attractive may only produce disillusionment and result in the dissipation of economic resources.

The failure to preserve law and order has led to the disintegration of the Congo and brought misery to a large part of its population. It is useless to hope that the West can improve the condition of the peoples of Africa unless at the same time peace and good order are maintained, as they were for so long and with great success by the colonial powers.

SAN FRANCISCO MINES OF MEXICO, LIMITED

The 48th annual general meeting of San Francisco Mines of Mexico, Limited will be held on March 21 at Princes House, 95 Gresham Street, London, E.C.2.

The following is the statement by the Chairman, **Mr. R. H. MacWilliam,** which has been circulated with the report and accounts :

It is with deep regret that I have to report the death in July last of Mr. A. V. Conrad, the Chairman of the Company. Mr. Conrad became an alternate Director of the Company in 1947, a Director in 1952 and Chairman of the Board in 1956. Through his untimely death we have lost a friend and colleague whose experience was invaluable to the Company, particularly in the difficult circumstances experienced in recent years.

The year ended September 30, 1960, resulted in a more satisfactory financial outcome, the net profit increasing to £407,000 compared with £134,000 in the previous year. This improvement was principally due to the sale of the whole of the inventory of zinc concentrates accumulated in the previous two years in addition to current production and to the higher prices obtained for lead, zinc and copper sold during the year. The quantity of lead sold, however, again fell considerably short of production. Once more this was due not to the U.S.A. quota system nor to the limitations on exports of lead imposed by the Mexican Government to conform with the United Nations Lead and Zinc Committee's recommendations, but to the weakness of markets in the United States and Europe. Further large sums were as a result tied up in unsold stocks of refined lead.

Since the end of the year the lead market has continued to be very weak and the problem of disposing of the large lead stocks still remains with us. On the other hand the Company will no longer be responsible for the sale of lead arising from the production of concentrates subsequent to January 1, 1961. In terms of new arrangements made with Cia. Metalurgica Penoles, S.A., the company which smelts our lead concentrates in Mexico, the metal contents of our concentrates will from that date be purchased on delivery to the smelter at the metal prices then ruling. Although the new arrangements will preclude our witholding our current lead ouput from the market from time to time in the hope of getting better prices, they free us from the burden of possibly having to accumulate further stocks, and, additionally, release certain amounts of cash which would otherwise be tied up in concentrates in process at the smelter.

In view of the calls to be made this year on the Company's cash balances, the Directors would not have been able to recommend the payment of a dividend in respect of the year under review had it not been for this special consideration, but under the circumstances they are pleased to recommend a dividend of 1s. 6d. per unit of Stock.

With regard to the Company's cash position I would add that since the end of the year there have been two particular factors which have affected the balance adversely. In terms of an amendment to the Mexican tax law it is now necessary to pay 75% of the estimated Production and Export Taxes on our zinc concentrates at the time of export. Previously it had always been the practice to pay these taxes only after all formalities such as assaying, etc., had been completed and this usually delayed payment for several months. Secondly, for various reasons it became necessary for us to become responsible for the payment of the considerable amount of Export Taxes and U.S. Import Duty on our unsold lead stocks in the United States at December 31, 1960. These taxes had previously been debited to us only when the lead in question was sold.

Operations

Throughout the year, production was maintained at full capacity and again established new records. It is particularly satisfactory to be able to record that, despite the ever-increasing cost of supplies, operating costs per ton of ore milled were again reduced and were comparable with those of 10 years ago. Development of the Frisco mine continued satisfactorily and ore reserves were increased as a result : the grade of ore milled was very similar to that of the previous year and mill metallurgy showed further marginal improvements.

Fluorspar

The pilot plant for the production of acid grade fluorspar concentrates from our mill tailings, to which reference was made last year, was operated successfully during the year and proved the process to be both practical and economic. It has now been decided to proceed with the construction of a plant with a capacity sufficient to treat our current mill tailings. The cost will be met from the Company's resources. This plant will be capable of producing about 60,000 tons of fluorspar concentrates yearly and sales contracts to cover the major part of the output are under discussion. It is confidently expected that this extension of our existing operations will bring useful increments to our future operating income.

Taxation

For many years now, it has been the Chairman's duty to comment on the heavy burden of Mexican taxes on the mining industry and the abortive efforts of the industry to convince the Government that such a tax policy was contrary to the long-term interests of the industry and hence of the country. Over the years, it has become apparent that so long as the major mining companies were incorporated outside Mexico and almost wholly foreign owned, the Mexican Government would not change their taxation policy. It is now reported that changes in the law are about to be promulgated and that these will give a considerable advantage to companies in which more than half the shareholding is owned by Mexicans. These changes are referred to below.

In the year under review, while there were no changes in the rates of Mexican taxation, the amount actually paid in taxes increased considerably. This came about through an increase in Production and Export Taxes, because of higher metal prices, and a substantially increased liability for Mexican Income Tax, because the Company made higher profits this year.

Mexicanization

During the last year there have been significant political developments in Mexico of great importance to Stockholders. " Mexicanization " of the mining industry has now been adopted as a major aim of Government policy. By " Mexicanization " I understand is meant first that the mines must be operated by companies incorporated in Mexico and second that at least 51% of the voting strength of those Mexican companies must be in the hands of Mexican nationals. For their part, the industry's representatives, including those of this Company, have fully accepted the principle that Mexicans should be encouraged to invest in the mining industry in Mexico. They have pointed out, however, that early in this century Mexicans did not have available the substantial sums of money necessary to develop large-scale mining operations, while in recent years it has been possible for them to invest their capital in less risky ventures in Mexico than mining. Moreover, latterly because of the heavy burden of Production and Export Taxes, mining has been less lucrative. In the first instance, therefore, the Government would have to provide an incentive to Mexicans to invest in the mining industry.

A new mining law has recently been adopted which, amongst other things, is expected to prohibit the acquisition of new mining claims by foreign controlled companies, while respecting existing claims. Simultaneously an amendment to the tax laws is said to have been adopted in terms of which a " Mexicanized " mining company would be entitled to a rebate of 50% of the Federal Government's share of the Production and Export Taxes. As this share amounts to about three-quarters of the total paid, the effect would be a net reduction of Production and Export Taxes of about 37½%, but any increase in profit as a result of this concession would still be subject to Mexican Income Taxes.

I believe that these changes may provide the necessary incentive for Mexicans to invest in the mining industry and, in case this is so, we must prepare ourselves to take advantage of any opportunties which may occur to introduce Mexican capital. At this time, it is impossible for me to suggest on what terms or how Mexican investors might be brought in, but as a first step the Company's Mexican operations will have to be transferred to a Mexican incorporated company. Your Company already has a Mexican subsidiary company and the Directors therefore applied to the United Kingdom Treasury and the Bank of England for permission to make such a transfer. These permissions have now been received. Permissions are also required from the Department of External Relations in Mexico and these are at present being sought. Provided they are forthcoming, the necessary transfers to the Mexican company will be made and your Directors will see whether an arrangement can be reached in terms of which Mexicans would acquire a 51% holding in the Mexican company on mutually satisfactory terms. I sincerely hope that it will be possible to formulate

a suitable scheme, and if it is, proposals for implementing it will be submitted to Stockholders in due course.

The Current Outlook

Since the close of the last fiscal year, both lead and zinc prices have weakened considerably. The Company has been barely breaking even, and has to face the prospect of demands for increased wages in the renegotiation of labour contracts in the middle of 1961.

The outlook for zinc is somewhat uncertain and it is possible that restrictions on the sale of zinc concentrates may be re-introduced, but, barring this, we expect to be able to sell most, if not all, of our production albeit at reduced prices. In the case of lead the outlook is not at all good. The market is now overhung by considerable stocks and, while world consumption of lead in 1960 did not decline, production continued to be in excess of demand and could not all be absorbed. As I have said earlier, from January, 1961, we shall no longer have the problem of selling our current production of lead, but the prices we obtain for the lead contained in our concentrates are unlikely to be satisfactory. Whether we shall be able to dispose of some or all of our large stocks of refined lead at anything like a satisfactory price during the current year is very doubtful.

From 1962 onwards, we can look forward to a useful increment in our income from the operation of our new fluorspar plant. Our mines are in first class shape and operating at the peak of their efficiency. I am, moreover, confident that in due course metal prices will recover and that we shall be in a position to reap the benefits of any such recovery.

These are not easy times for our staff in Mexico and I am sure you will wish to join me in expressing my thanks both to them and to Mr. H. B. Hanson, our General Manager in Mexico, and Mr. A. B. O'Neel, our Assistant General Manager, for their loyal services and great efforts on the Company's behalf.

JANTAR NIGERIA CO. LTD.

The forty-eighth annual general meeting of Jantar Nigeria Co., Ltd., was held on February 22 at Winchester House, London, E.C.2.

Mr. R. T. Janson, Chairman, presided.

The following is his Statement circulated with the Report and Accounts for the year ended September 30, 1960 :—

During the year under review Mr. Charles Tarbutt resigned as Chairman of the Board and he has also relinquished the post of Managing Director. I am sure that you will wish me to thank Mr. Tarbutt for the help and guidance which he has given us whilst he was Chairman and Managing Director. Mr. Tarbutt will remain a member of the Board.

I am sorry to have to tell you that owing to ill health Mr. William Pocock has found it necessary to resign his seat on the Board. Mr. Pocock has been connected with the affairs of the Company since the date of its incorporation in 1912 and all our thanks are due to him for what he has done for the company during its 49 years' existence.

Mr. A. L. Thomas, A.C.S.M., M.I.M.M., has been appointed to the Board to fill the vacancy caused by Mr. Pocock's resignation and you will be asked to confirm this appointment in due course.

As Stockholders will know, the Bisichi Tin Company (Nigeria) Limited made a bid for the whole of your company's share capital. Your Board of Directors opposed the bid for two reasons :—

1. That it was untimely as the profitability of the primary columbite deposit had not yet been proved by actual working;

2. That the terms were inadequate when comparing the published ore reserves of the two companies.

Acceptances of the offer were insufficient to enable the Bisichi Company to obtain control of your company. Owing to the fact that stock can be registered in the name of nominees it is impossible for us to give you an accurate figure for the percentage of our issued capital held by Bisichi, but we have reason to believe that it is now between 25% and 30%.

Output

The output for the year was 203.13 tons tin and 237.99 tons columbite, as compared with 147.54 tons tin and 232 tons columbite last year. Throughout the year tin production was restricted but by the end of the year our permitted output was raised to 100% of the quota allotted to your company under the Tin Restriction scheme.

Columbite

The whole of the company's output for the year was sold at prices slightly in excess of those for the previous year. Contracts have been entered into for the disposal of the bulk of the estimated calendar year's production at prices to be negotiated quarterly.

Ore Reserves

The ore reserves of the company at September 30, 1960, amounted to 1,762 tons tin and 4,964 tons columbite compared with 1,404 tons tin and 1,796 tons columbite at September 30, 1959.

The increase in Columbite Reserves is accounted for by the addition of proved reserves of Primary Columbite on the Kuru III property of which you were informed in March last year.

Production of primary columbite commenced in July, 1960, and by September 30, 1960, approximately 27 tons had been produced from this area.

During the first three months of the current financial year a total of 45 tons of primary columbite were produced out of a total columbite production for the three months of approximately 90 tons. Experience of working has confirmed the low cost of production from our primary columbite deposit.

Barites

As I have previously told you, your company is interested in the exploitation of barites in Nigeria, where a large tonnage of barites has been indicated to date.

Since I first told you of this venture we have disposed of 50% of our interest at cost, as the estimated capital requirements are a good deal higher than had at first been anticipated.

A large amount of preliminary test work has been satisfactorily completed and we are at present awaiting a report from an independent mining engineer who is investigating the whole project. On its receipt we should be in a position to come to a final decision whether or not to proceed with the venture.

General

Net Profit for the year after taxation amounts to £25,720. Adding to this the amount brought forward from last year of £20,892 and Provision for Taxation no longer required of £3,516, the distributable balance standing at the credit of the Profit and Loss Account is £50,128.

Your Directors recommend the payment of a dividend of 6d. per share (20%) less income tax at 7/9 in the £, which will absorb £27,563 leaving £22,565 to be carried forward. This compares with 4½d., or 15%, paid last year.

Your Directors are proposing to alter Article 91 of the Company's Articles of Association, relating to their additional remuneration.

The present Article was framed when the profits of the company were considerably higher than they are now owing to the United States 100% bonus on columbite, and your Directors consider that the additional remuneration payable to them under the present article is too great a burden in relation to the present rate of profit. You will therefore be asked to pass a resolution to alter Article 91 which will limit the Directors' Additional Remuneration to 5% of the amount distributed as dividend, with a maximum of £5,000.

This has been a year demanding exceptionally intensive work, especially with regard to the opening up of the primary columbite. I am sure you would wish me to express your gratitude to the Manager and staff in Nigeria, both European and African, who have responded readily to all the demands made on them with both enthusiasm and efficiency.

Stockholders will remember that in the autumn of 1960 Nigeria attained full independence. We look forward with confidence to the continuation of our activities in Nigeria under the new government which has given its assurance on more than one occasion of its desire to see British capital continuing to take part in the development of this great country.

In conclusion, the prospects for the current year are favourable provided always that the market for our products, columbite and tin, is maintained.

The report and accounts were adopted.

BARROW HEPBURN AND GALE

MORE PROMISING OUTLOOK

The 40th Annual General Meeting of Barrow Hepburn & Gale Limited will be held on March 16 in London.

The following is an extract from the circulated statement of the Chairman, **Mr. George W. Odey, C.B.E.:**

Trading conditions for the leather industry in 1960 proved to be extremely difficult. The tremendous advance in the price of hides and the subsequent decline which occurred in 1959 inflicted very grave injury on the tanning industry inasmuch as it led to a steep advance in leather prices at a time when there was keen competition with the substitute materials. As a result, particularly in sole leather, much ground was lost, some of which is now only beginning to be recovered. In short, 1960 has been the aftermath of the fluctuations in price that occurred in 1959. The price of both sole and upper leather declined during the year by fully 20 per cent and it was not until the last two months of the year that this decline was reversed and an improvement in trading conditions occurred.

Sole Leather Industry: For the industry generally the stock of sole leather in tanners' hands have been considerably reduced during the year and it would appear that the present rate of production for the industry as a whole is now adjusted to the overall demand. During 1960 more sole leather tanneries were closed and, provided there is no serious fluctuation in the price of our raw material, the prospects for the sole leather industry would appear to be brighter than they have been for many years.

Upper Leather Interests: We have been able to make excellent progress in spite of the fact that we were operating on a declining market.

Diversification

While your Board has been quite determined to maintain their position in the tanning industry so far as both sole and upper leather are concerned, we have continued to pursue a policy of diversification. As announced on March 3, 1960, we have acquired the whole of the share capital of Colloids Inc. of New Jersey, U.S.A., manufacturers of synthetic-sizing materials and related products. Subsequent to the acquisition of Colloids Inc. we decided to acquire a further company, Cellate Inc. situated in Franklin, New Jersey, which is important to the group as producing one of their more essential raw materials.

The chairman then reviewed the Group's other activities and referring to the Board's dividend policy stated: In spite of the more promising outlook for 1961 we did not feel justified in repeating last year's dividend, but we feel that there is every justification for making the Ordinary Dividend 15 per cent.

May I say in conclusion that the sole leather position at long last looks as though it may reach a state of equilibrium in its fight with the substitute material. We have every reason to believe that the year before us offers a better promise on a firmer basis than any period that we have experienced in recent years.

Board Changes

Mount Isa Mines has announced that Mr. A. M. C. Buttfield has joined the board of directors.

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Mr Charles F. Geddes has been appointed a director of British Tin Investment Corporation and its subsidiary companies, B.T.I.C. (Overseas), and Tin Industrial Finance and Underwriting, as from February 15, 1961.

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The Consolidated Zinc Corporation announces that Mr. Paul V. Emrys-Evans, vice-president of The British South Africa Co., has been appointed a director of the Corporation.

*

The Rio Tinto Mining Co. of Australia has announced that Mr. P. W. Robinson has been released by the company's directors from his position of deputy managing director to enable him to accept an invitation to join the London organization of Consolidated Zinc Corporation, and will take up an appointment there associated with the development of the Corporation's aluminium interests.

Obituary

MR. WILLIAM SELKIRK

The death has been announced of Mr. William Selkirk, on February 16, 1961, at the age of 92.

Mr. Selkirk, who was born in Cumberland, was articled as a pupil with a consulting mining engineer in Whitehaven, and obtained his training in the West Cumberland Iron Ore Mines. During the 1914-1918 war he was for two years controller of the iron mines in Cumberland and Furness district, North Lancashire.

He retired from private practice in 1925 and immediately joined Mr. (now Sir) Chester Beatty, who had recently formed a company called Selection Trust. Early in 1926 Mr. Selkirk visited Northern Rhodesia, examining the various areas containing outcrops of copper now known as the Copperbelt, and, in particular, the large area held by Selection Trust, where only surface work had so far been undertaken. He recommended and laid out a programme of deep drilling, which proved large deposits of sulphide copper ore at depth in the area now worked by Roan Antelope. It was this discovery that gave a big impetus to the development throughout the Copperbelt.

Mr. Selkirk was a director of many companies including Rhodesian Selection Trust, Consolidated African Selection Trust, and Trenca Mines, and was vice-chairman of Selection Trust. He retired at the end of 1945.

Mr. Selkirk was a Fellow of Imperial College, a member of the Institution of Mining and Metallurgy, and of the American Institute of Mining and Metallurgical Engineers and an Honorary Associate of the Royal School of Mines.

*

The death is announced of Sir Charles C. Reid, at the age of 82. He was chairman of the Reid Committee, whose report in 1945 on mining was used as a basis for the reorganization of the coal mining industry in Britain in 1946.

Personal

Mr. Richard Adams has been appointed general manager of a newly created engineering division of Castrol Ltd. Senior buyer to the division is Mr. S. G. Aves, and Mr. G. Meredith is office manager.

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The retirement is announced of Mr. F. J. Newman from Pritchett & Gold and Exchange Publicity Services, after over 40 years' service.

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Mr. Alan Threlfall has been appointed sales manager of Perkins Gas Turbines, and will responsible for co-ordinating Perkins gas turbine sales throughout the world.

DAVIES INVESTMENTS LTD., Private Bankers (Gross assets exceed £2,500,000), are paying 7½% p.a. interest on deposits for the **eighth** year in succession, with extra ½% added annually on each £500 unit. Details and Audited Balance Sheet from Investment Dpt. MN., Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

Mill Superintendent required for Base Metal Mine in Sierra Leone. Experience of reduction and gravity concentration. Tours 12-15 months. Free furnished quarters provided, also free fuel, light, water and medical attention. Salary according to qualifications and experience. Write giving full particulars to Box 690, The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

MALAYA

ASSISTANT MECHANICAL ENGINEERS required for Tin Dredging Companies in Malaya. Preferably married men aged 23/30.

Applicants must have served a full engineering apprenticeship with technical school training and have had five years' practical experience.

Salary at rate of £1,190 p.a. for 1st 6 months, £1.274 for next 12 months and £1.316 for remaining 18 months of 1st contract.

In addition marriage allowance £280 per annum. Free passages to and from Malaya for employee and family.

Provident fund and non-contributory pension scheme; free furnished quarters. 1st Contract for three years' with six months' home leave on full pay.

Write giving full particulars of age, education, training and experience to Box 565, c/o Walter Skinner, Ltd., 20 Copthall Avenue, London, E.C.2.